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*PROCEEDINGS*

# Pacific Logging Congress

FIFTEENTH SESSION

*Portland, Ore.— Longview, Wash.*

October 22-23-24-25, 1924

PRESENTED WITH THE COMPLIMENTS OF
DEER PARK LUMBER CO., DEER PARK, WASH.

COMPILED AND ISSUED BY
the TIMBERMAN
PORTLAND, OREGON
U. S. A.

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# *PROCEEDINGS*

OF THE

# Fifteenth Pacific Logging Congress

Held at Multnomah Hotel, Portland, Oregon
*and* Longview, Washington

*Oct.*
*22-23-24-25*
*1924*

Compiled and printed by
THE TIMBERMAN
AN INTERNATIONAL LUMBER JOURNAL
GEO. M. CORNWALL, EDITOR
PORTLAND, OREGON, U. S. A.

# The Fifteenth Pacific Logging Congress

## Logging Operators Meet in Portland for Annual Exchange of Ideas and Discussion of Mutual Problems—Congress Delegates Inspect New Mill of Long-Bell Lumber Co. at Longview, Wash., Where Annual Banquet Is Staged—Visit to Ryderwood to View Electric Logging Operations Forms Interesting Trip—D. E. Stewart Re-elected President.

AFTER a swing of the circuit, bounded on the north by Vancouver, B. C.; on the east by Spokane, and on the south by San Francisco, the Pacific Logging Congress returned to Portland, Ore., October 22-24, for its fifteenth annual session. At the business meetings held in the Grand Ball Room of the Multnomah Hotel the delegates gave close attention to a series of excellent papers on logging topics that elicited much interesting discussion. On Thursday evening was held the annual Welfare Dinner, under the auspices of the Young Men's Christian Association.

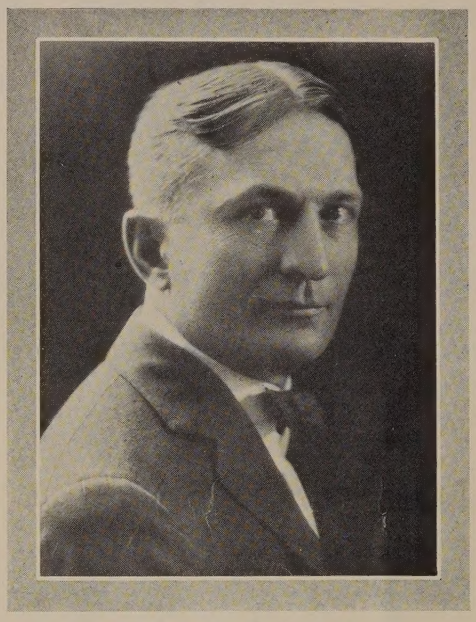
Friday noon the formal sessions were adjourned and the delegates were taken to Longview, Wash., to witness the operation of the new sawmill of the Long-Bell Lumber Co. The annual banquet was celebrated in appropriate style at the St. Helens Inn, Longview. Saturday, October 25, was given over to the annual field trip and the members, as guests of the Long-Bell Lumber Co., were taken by special train to Ryderwood, where the modern, all-electric logging operations of this great company were inspected.

The business sessions were presided over by President D. E. Stewart, who was re-elected for the ensuing year. Mr. Stewart called the Congress to order on Wednesday, October 22, at 10 A. M., introducing Mayor George L. Baker, of Portland, who delivered the address of welcome. The full and official proceedings of the convention appear below:

## Address of Welcome

MAYOR GEORGE L. BAKER: Mr. President, and members of the Pacific Logging Congress: I am pleased to come before you this morning and extent to you a welcome to the city of Portland. As your chairman has stated, about seven years ago, when I was elected mayor, we had considerable I. W. W. trouble, and the first move that I made was in that direction, because I recognized that the greater part of our industry was the lumber industry and that it needed attention and protection at that time. I guess that I did attain a little reputation in handling that situation; but it is strange to say in the events of the country and the affairs of men that the man or the group of men that you direct your efforts against remembers and those that you work for forget. But be that as it may, I had a plain duty. I am not entitled to any consideration or credit for any service that I might have rendered in that direction, because I don't believe in radicalism; I don't believe in I. W. W.'ism; I believe in Americanism, and I believe that we all have a right to do our business in a legitimate way, without having groups interfere, particularly when their object is not in the interest of good government.

I have no apologies to make, but I just want to call to your attention the fact that conditions are changing rather fast. We have hopes that our ship of state will sail on an even sea; that there will not be any large numbers rocking the boat; but, nevertheless, in the offing there are troubled waters, and what did exist seven or eight years ago among that element can come back. It all depends on the attitude of mind of the people who are responsible for government. If you want radicalism you can have it, because there are certain groups that deal in



PRESIDENT D. E. STEWART

that particular kind of thing. So don't let your lethargy or your indifference to the affairs of your country go unnoticed at this time.

I hope and trust that your deliberations will bring benefit to you and to the Northwest, because we appreciate that you represent a large industry, an industry that is essential to the building of our country; and I welcome you on behalf of our people and trust that your stay in our city will be pleasant and profitable.

## President's Address

PRESIDENT STEWART: It seems to me that the attendance here and at other sessions of the Congress certainly justifies the conclusion that the Pacific Logging Congress is a real institution. It fills a needed place in the logging industry of the West. We should all be deeply grateful to George M. Cornwall and Uncle Ed English, who unfortunately cannot be here with us, and all the others who were instrumental in founding this organization some fifteen or sixteen years ago.

The main object of coming here is not so much to tell of the big things we have done, but rather, to make serious inquiry into the possibilities of improving our logging methods, with a corresponding reduction in costs, which always goes hand in hand with proper efficiency. Our logging methods and records should be as an open book to each other, at least; and those of us with proper ability need have no fears about competition from our neighbors. Our greatest enemy is not fire, and certainly not competition from our neighbors, but it is the competition from substitutes for lumber. It is a recognized fact that the manufacturers of the substitutes for lumber are a very keen, aggressive and efficient aggregation of business men, and if we in the logging and lumber business are to compete with them we must be just as keen, efficient and aggressive in our business as they are in theirs. If we can, by improved methods and actions, reduce the cost of logging throughout the West by fifty cents or a dollar per thousand, I think we shall have taken a long step toward overcoming competition. Furthermore, we will have that most satisfying feeling which always comes from work well done.

## Secretary's Report

SECRETARY-TREASURER J. T. DOUGALL followed Mr. Stewart's remarks with his report of the financial standing of the Congress, which showed the organization to be in a healthy condition, with a substantial balance in the treasury and no outstanding indebtedness. Mr. Dougall also read a telegram from Geo. M. Cornwall, editor of The Timberman, regretting his inability to attend the Congress, which appears below:

**Telegram.**

Berkeley, Cal., October 22.

Pacific Logging Congress: My medical master mechanic has me in the shop for repairs, which includes boring out my high-pressure cylinder and taking the knock out of my crosshead, hence I will not be able to enjoy the Congress which has meant much to me. Hope Ed English is on the job and Brother Donovan is swatting the Ku Kluxers. Will be thinking of all the old logging boys for the next four days. May this Congress be the most worthy and helpful of any former session. The Congress has made history and men. Sincerely,

GEORGE M. CORNWALL,
Editor The Timberman.

President Stewart: We will hear from Dr. J. S. Boyce, forest pathologist, on the subject of "Decay in Douglas Fir in Relation to Timber Cruising."

*Delegates to the Fifteenth Session of the Pacific Logging Congress which met in Portland, Oregon*

# Decay in Douglas Fir in Relation to Cruising

By J. S. Boyce, Pathologist U. S. Department of Agriculture

### *Introduction*

IN addressing this gathering it is unnecessary to impress you by the presentation of figures with the enormous losses in Douglas fir timber from decay. All of you are only too familiar with the large number of cull logs left in the woods and the staggering amount of worthless lumber that finds its way to the refuse burner from this cause alone.

As a consequence of decay, cruising or estimating Douglas fir timber is rather uncertain, with frequently a wide discrepancy between the cruise and the actual cut on operations in overmature timber. Even in the past with low stumpage values and operating costs, this has been a serious matter, but with timber rapidly increasing in value and its growing scarcity resulting in the exploitation of more defective stands, exact cruising becomes very important. In order to estimate with accuracy, a sound knowledge of the indications of decay in standing trees is essential.

But before proceeding with the discussion of the results of studies on this point it may be well to consider briefly just what decay is and how it develops. Contrary to popular belief, it is not inherent in the soil nor is it the work of "bugs."

### *How Decay Is Caused*

DECAY in Douglas fir is caused by wood-destroying fungi. The fungus, a low form of plant life, consists of very fine threads called hyphae, which are invisible to the naked eye unless they occur in mass. Individual hyphae require magnification by a compound microscope. Collectively the hyphae are termed mycelium, and a closely woven felt-like mass of hyphae is known as mycelium felt or sheet. The hyphae of wood-destroying fungi feed on the various substances composing the cell walls of the wood. They use certain constituents of the cell walls, neglecting others, with the result that the cell walls are broken down, the wood being thus greatly weakened and more or less destroyed. It is the breaking down of the wood and the change in its physical and chemical qualities that is termed decay. The fruiting bodies, sporophores or conks, are formed on the outside of the tree, usually of a bracket-like or hoof-shaped form. They are not developed until the hyphae have been at work for some time, consequently the presence of sporophores indicate serious decay. On the under side of the sporophores are innumerable pores varying in size and shape with the species of fungus, and in these are developed the spores. Dropping from the pores, these microscopically small and very light reproductive bodies of simple structure termed spores are carried about by air currents. If they light in a suitable place under proper conditions germination takes place and hyphae develop. The hyphae cannot penetrate bark or living sapwood, so in order for infection to occur the sports must light on exposed dead wood. Such points are offered on living trees by wounds destroying the bark or by dead branch stubs.

The fungi causing decay in living Douglas firs confine their activities to the dead heartwood, the living sapwood is not attacked. After a tree is dead, however, the sapwood is rapidly destroyed, usually by other fungi than those most destructive in the living tree.

Four species of wood-destroying fungi are responsible for all but a very small portion of the decay found in Douglas fir. They are the ring scale fungus (Trametes pini), the velvet top fungus (Polyporus schweinitzii), the quinine fungus (Fomes laricis), and the rose-colored fomes (Fomes roseus). The ring scale fungus causes decay commonly known as conk rot in this region in which the wood is riddled with small white pits or cavities, apparently separated by sound wood. The decay is not confined to any one portion of the bole. The sporophores or conks are very common in overmature Douglas fir stands. These fruiting bodies issue from the tree through knots and are perennial; that is, growth continues for more than one season. They vary in size and shape from bracket-like to hoof-shaped. The upper side is a dull grayish or brownish-black, rough, with concentric furrows parallel to the light brown margin. The under side is a grayish brown or rich brown color with large irregular pores. The substance of the sporophore is corky or punky.

The velvet top fungus causes a red-brown crumbly butt rot rarely extending higher than the first 16-foot log, and for this reason it is named red-brown butt rot, which is usually shortened to just butt rot. The sporophores or conks appear either on the infected tree or on the ground near by, and are annual; that is, growing for one season only. They are rather large with a light brown upper surface, olive green or dirty green under surface, and a cheesy consistency when young but when old and dry are a dark rusty brown and corky. Sporophores on the ground have a short thick stalk.

The quinine fungus has a large, conspicuous whitish perennial sporophore not at all common on living trees. The substance of the sporophore is white, soft and cheesy when young and rather crumbly and chalky when old and dry, with an exceedingly bitter taste. Hence the name. On the older sporophores the upper surface is rough and chalky, white or brownish in color. The pores are small. The decay, known as brown trunk rot, is not confined to any particular portion of the heartwood in the trunk, is a crumbly brown rot easily recognizable by its mycelium felts or sheets (i.e., closely woven masses of fungus hyphae). The sporophore of the rose-colored fomes (pronounced fomeez) is easily recognized by the delicate rose color of the under surface. The pores are small. The upper surface is rough, hard and black. The decay caused by this organism is a yellow-brown crumbly decay with mycelium felts much less conspicuous than those of the quinine fungus. Furthermore, this decay is usually confined to the upper portion of the tree in connection with dead tops, and in many infected trees the decay does not extend into the merchantable portion of the tree. Because of this habit it is called yellow-brown top rot.

Conk rot is responsible for by far the greatest amount of cull in Douglas fir. In fact, if the species were free from this defect it would take its place with the pines as a sound tree. For example, 169 trees with a total volume of 203,920 feet board measure were carefully studied. There was a total cull from decay of 45 per cent, of which 39 per cent was conk rot.

### *How the Decay Enters*

AS explained before, decay is spread by means of wind-blown spores, which must light on exposed dead wood in order to cause infection. However, the point of infection varies with different species of decay, and it is of value to know the common means of entrance in each case, since this aids in judging decay in living trees.

Practically all conk rot enters through dead branch stubs. Fire scars provide the mode of entrance for most of the red-brown butt rot, although it seems that this decay can also spread by the contact of diseased root with a sound one in the soil, so that some of the rot is traceable to this method of infection. Brown trunk rot and yellow-brown top rot results from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*October 22-24, and Longview, Wash., October 25, grouped before the Multnomah Hotel, official headquarters*

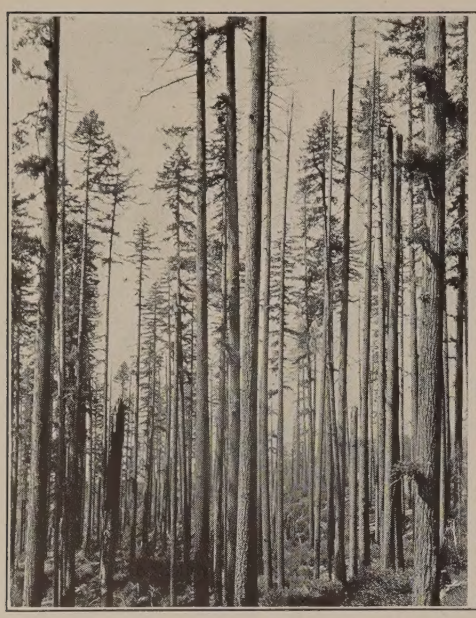

*Fig. 1—Defective Douglas firs left standing after logging. Principal defect is decay caused by the ring scale fungus (Trametes pini)*

*Fig. 2—Burl on Douglas fir not a sign of decay*

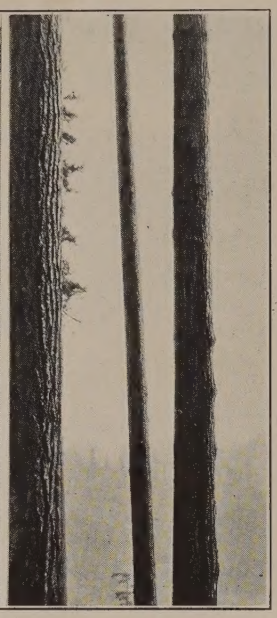

*Fig. 3—Swollen knots or blind conks, indicating conk rot in the tree*

infections entering through dead branch stubs, broken or dead tops and other wounds.

Recognition of the indications of decay in standing Douglas fir or in logs is of the greatest importance from a practical standpoint. At present there is a great deal of confusion and misinformation among foresters and lumbermen in regard to the detection of decay in living trees and the specter of "hidden defect" assumes unnecessary proportions. As a matter of fact, decay reveals itself to the initiated more easily in Douglas fir than in any other species on the Pacific Coast.

A large tree with many dead limbs in the lower crown is not necessarily decayed. Such a tree merely grew faster than its neighbors and the limbs did not die so soon through lack of light. Consequently it requires a longer time for such limbs to drop off and for the branch stub to heal over. A group of limbs radiating like a fan from one point does not indicate decay in the tree. These limb fans are found on both sound and decayed trees.

Douglas fir when bruised is very subject to the formation of burls at the point of injury. Such burls are a disorganized mass of woody tissue with gnarled or twisted grain. Their formation is a direct response to the irritation caused by the injury and may be likened to the formation of tumors on animals. Consequently burls must not be considered an indication of decay in any way, although this mistake is not uncommon.

### *Sporophores Indicate Decay*

SPOROPHORES are of course the best indication of decay. Sporophores of red-brown butt rot, being annual, are not common, but can always be found now and then in a locality where the trees are affected. However, the best clue is fire scars. The large majority of fire-scared trees are infected with this decay through the fire scar, so it is possible to judge the relative amount of the rot by fire-scarred trees in the stand. Even though a scar has been healed over for a long time it can often be detected by the variation in the appearance of the bark over the healed wound. This appearance is hard to describe but not difficult to judge after a little experience Swollen or churn butts usually indicate red-brown butt rot since the abnormality is the result of a fire scar or other wound long since healed. Culling eight feet of the butt log is a sufficient average allowance for this defect.

Yellow-brown top rot is rather hard to detect. While sporophores are not uncommon, they are so high up in the trees as to be easily overlooked, and, in fact, are often completely hidden by the branches. However, the amount of loss through this decay is very small in the aggregate.

Brown trunk rot also is rather hard to judge. Sporophores are rare on living trees, but when they do occur are very conspicuous and not readily overlooked. Furthermore, they indicate extensive decay and a tree with a single sporophore of this rot should be culled. On the whole, the loss caused is small, but occasionally a badly overmature stand being replaced by hemlock is encountered. Such a stand is characterized by big overmature Douglas firs with large limbs in the top, stag heads and spike tops. The trees may be relatively sound but are more often highly defective from brown trunk rot and show very little indication of their true condition. Hints may be obtained from limbs or tops recently broken off, but such timber requires the utmost skill and judgment of an experienced cruiser, and even then the results are often not too satisfactory. But then, stands of this type are not abundant.

### *Conk Rot Relatively Easy to Detect*

FORTUNATELY the decay causing by far the greatest loss in Douglas fir is relatively easy to detect. Sporophores of conk rot occur abundantly. As a rule very little rot develops in a tree before a sporophore appears, or if not a sporophore, at least a swollen knot or blind conk, as it is otherwise known. A swollen knot is the initial stage of a sporophore in which the substance forming the conk is pushing its way out through a knot and forcing out the bark. Hence it is just as good an indication of the presence of decay as a sporophore. Often the sporophore never develops beyond this stage. Chopping into one of these swollen knots reveals a brown punky substance, the same as in a fully developed sporophore. The development of swollen knots and sporophores follows rather closely the progress of the decay in the heartwood. It was found in the trees mentioned before that of the 39 per cent loss through conk rot only 1.6 per cent did not show sporophores on the trees and less than .1 per cent did not show swollen knots. So it is possible to pick out rather accurately trees affected with conk rot in a stand. When high up in a tree among the branches swollen knots are not easily seen, but if overlooked there it does not make so much difference in accuracy of an estimate since the scale of the top logs is relatively insignificant in the total.

It is always difficult to estimate decay in fire-killed timber, but even there conk rot can be detected. The dry, punky substance of the sporophores or swollen knots extending deeply into the tree burns readily, while the surrounding bark is merely scorched and blackened, resulting in circular holes two to three inches across running several inches into the trunk—thoroughly reliable indications when their significance is understood.

It is not only possible to pick out the decayed trees but it is also feasible to judge with some exactness the normal extent of conk rot. In the trees studied it was found that the decay usually extended about 20 feet beyond the last sporophore and about nine and one-half feet beyond the last swollen knot. This difference is due to the fact that the swollen knot is generally the initial stage in the development of the normal sporophore, and consequently by the time a sporophore appears the decay has been in the tree longer and has progressed farther than at the formation of a swollen knot. Of course individual examples varied considerably from the distances given, but these figures are a good average and have checked well with the writer's observations since. The foregoing applies to two or more sporophores or swollen knots separated vertically by at least a few feet. A single sporophore or knot, or two or more together, are not connected with extensive decay, the cull sometimes amounting to only a few board feet, but an average rule is to cull eight feet in each direction, or a 16-foot log.

### *Conclusion*

IT is not within the province of this talk to go into the actual method of cruising, but a brief word on two invaluable pieces of equipment must be added for completeness. Field glasses are essential if the trees are to be examined with any accuracy. In addition a volume table by diameter and height classes giving the volume for each 32-foot log is necessary.

Finally, it may interest you to know that our studies on defect in Douglas fir are being greatly

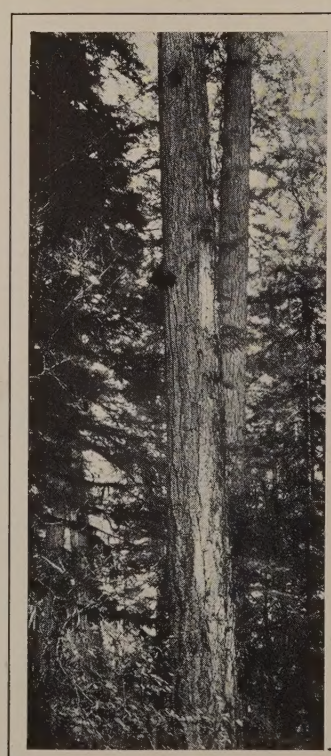

*Fig. 4—Sporophores of the ring scale fungus (Trametes pini) indicating conk rot in the heartwood of the tree. (Photo by G. G. Hedgcock.)*

*Fig. 5—Sporophores of the velvet top fungus (Polyporus schweinitzii) indicating red-brown butt rot in tree. (Photo by G. G. Hedgcock.)*

*Fig. 6—Brown trunk rot caused by the quinine fungus (Fomes laricis). The decay is not confined to any particular portion of trunk and is usually extensive in an infected tree.*

*Fig. 7—Conk rot caused by the ring scale fungus, illustrating an advanced stage of the decay. In incipient stages rot is indicated by reddish-purple discoloration.*

*Fig. 8—Red-brown butt rot caused by the velvet top fungus. Only a thin shell of sapwood remains. Trees so badly decayed are subject to windfall, particularly if the rot extends into the roots. (Photograph by G. G. Hedgcock.)*

*Fig. 9—Sporophores of the quinine fungus. These conspicuous whitish fruiting bodies are not common on living trees, but are found more often on dead, down timber. The sporophore has a bitter taste.*

*Fig. 10—Cross-section of a Douglas fir top showing the upper surface of a sporophore of the rose-colored Fomes (Fomes roseus) and yellow-brown rot caused by this fungus.*

extended. Measurements have been taken on 38 plots of felled timber in different aged stands on representative logging operations throughout the west slope of the Cascade Mountains in Oregon and Washington. When these figures become available they will afford exact information not only on the loss from decay, but from breakage in falling and all other defects over a wide range of conditions.

## Discussion

DR. BOYCE: You can realize that a spore is a rather small object when a microscope magnifying four hundred times gives an object about one-sixteenth of an inch in diameter. These fruiting bodies, the sporophores or conks, are not developed on the tree until decay has been at work for some time. Whenever you see conk on the outside of the tree it means considerable decay. The spores dropped from the under side of these conks are borne about by the wind. To infect another tree they must light on an exposed dead wood. The only exposed dead wood on trees is either dead branch stubs or old wounds, such as fire scars, spike tops, or stag heads, or where the bark has been broken off by falling trees.

We will now consider the fungi causing decay in living Douglas fir. There are four of these of importance. The first one, shown in the accompanying slide (Fig. 7), and the most important, is the decay known as conk rot. It causes small white pits throughout the wood. These pits are separated by areas of what look like relatively sound wood, and the decay often follows certain definite annual rings either partly or entirely around the log, giving it a circular appearance and leading to its world-wide name of ring scale fungus.

The next slide (Fig. 4.) shows the conks of this decay on a large, overmature Douglas fir on the Row River. All of you are perfectly familiar with these conks who have worked in Douglas fir timber. The next slide (Fig. 8.) shows the common butt rot of Douglas fir. This decay rarely ever extends higher than the first sixteen-foot log, although I have found it as high as fifty feet or more in the tree.

### *Conks Illustrated by Slides*

The next slide (Fig. 5.) shows the conks of this particular butt rot growing on the base of a tree. It may either grow there or on the ground. They are light brown in color and become darkened with age. They last only for a season, and, as a general rule, the average person does not recognize them when they see them. Thus butt rot quite frequently is passed up in trees. A conk of that kind on the base of the tree or on the ground near the tree means rather extensive decay.

The next slide (Fig. 9.) shows a conk of the quinine fungus, so called because in Europe it is a source of commercial quinine. This is white, large and chalky in appearance.

The decay shown by the next slide (Fig. 6.) runs throughout the trunk of the tree and can be distinguished from the butt rot by the white mycelium felts; that is the white mass of fungus threads that you can see indistinctly in the decayed wood. The decay is such that you can take the wood in your fingers and crumble it into powder.

The next slide (Fig. 10) shows a rot and conk little known to you, although not uncommon. That section is about ten inches in diameter. The decay is usually confined to the tops of the trees, coming in through dead tops or branch stubs, and usually causes very little commercial damage. In standing timber it is exceedingly difficult to see.

R. W. Vinnedge: Is there any definite direction decay will take from the conk? Is there any definite information upon which a cruiser can base the extent to which rot has already invaded the tree, either up or down?

Dr. Boyce: Yes. The rule I gave is only an empirical rule. For single conk, or a group of conks, scale out eight feet in each direction, or a sixteen-foot log. If those conks are separated by several feet, cull about twenty feet above and below the highest and lowest conk; if they are swollen knots, nine and a half feet, usually making it just ten feet above and below.

In further reply to your question, our studies have shown that decay progresses a little more rapidly down the tree than it does up, because as it goes down it is getting into older wood, which is more subject to decay. That is why overmature stands are more defective than young stands.

Mr. Vinnedge: What relation does the age of the tree have to the operation of the conk?

### *Relation of Decay to Age*

Dr. Boyce: That is a thing that is troubling a great many owners of overmature Douglas fir timber, and I can only tell you that at one hundred years of age there will be less than five-tenths of 1 per cent of decay in the average stand; at one hundred and fifty years of age the loss will be around 5 to 7 per cent. At four hundred years of age you may have a loss of from 10 to 75 or 80 per cent. I have seen stands so poor that they simply could not be logged. From one hundred and fifty to four hundred years, a space of two hundred and fifty years, you may find decay run up to 75 or 80 per cent, but as a rule it will not often run more than 50 per cent. Granted that it goes from 5 to 50 per cent in two hundred and fifty years, that is an increase of 45 per cent, or, roughly, 2 per cent each decade. So when you hear anyone say that he examined a stand of Douglas fir timber ten years ago and that it was sound and free from defect, and he went in just recently and was amazed at the increase in the amount of defect, just one of two things happened. He didn't see the defect in the first case, or he is making a correction on his original cruise and blaming it on decay. Decay does not work that fast. Nevertheless, that is a common statement I have heard repeatedly. I have heard trained foresters say that in five or ten years they were amazed at the difference in the stand of Douglas fir. But from the standpoint of decay that difference could not be detected, unless it was made by cruising a strip of timber, in which every tree was given a number, and you returned to that same tree with the number on it ten years later and checked your previous estimate against the present one. Decay is rather a slow working thing.

President Stewart: Dr. Boyce, did I understand you to say that you make the same allowance for one conk as for several close together?

Dr. Boyce: Yes.

President Stewart: Isn't there any more rot where there are two or three conks close together?

Dr. Boyce: There is apt to be a little more, but in cruising you can't take it into account. One conk on one side of the tree alone may give you only twenty or thirty board feet of decay. If there is a conk directly opposite on the other side, there will be more decay. But it is difficult to get distinctions that fine when you are examining a stand of timber. In down logs you can do it by examination of the log, but where there is a single conk or two or three within one foot of each other, we throw out a sixteen-foot log.

President Stewart: Is there a difference between white conk and the ordinary black conk?

Dr. Boyce: Yes. If you see that big, white conk, cull the tree.

President Stewart: What is the particular difference between them?

Dr. Boyce: They form from an entirely different kind of decay. Wood is composed of a cellulose framework. Cellulose is nothing more nor less than pure cotton. Pure cotton is as close to cellulose as anything I can describe. Wood is composed of cellulose, on which is laid down the so-called lignin or woody substance. Certain types of decay, of which the small black conk is one, dissolve out the lignin and leave the cellulose, and that is what you see in those small white pits. Other types of decay, of which the white conk represents another, dissolve out most of the cellulose and leave the lignin substance slightly changed in form. The wood then has no framework and you can crush it between your fingers.

President Stewart: What is the difference between a conk and a blind conk?

Dr. Boyce: The conk is the actual sporophore on the tree. A blind conk is a swollen knot. It is either the young stage of the conk or it is a conk that will never develop.

President Stewart: I used to try to cruise timber, and I always assumed that stump rot was just natural decay in an old tree that started to die. But there is apparently a real stump rot conk?

Dr. Boyce: Yes; there is a stump rot conk.

President Stewart: Is it much different from the conk in the upper part of the tree?

Dr. Boyce: Entirely different. Stump rot conk looks like a brown cow chip. Finding those things on the ground gives you a good idea of the amount of stump rot there must be in that stand. Trees with butt rot are quite subject to wind fall, but the actual loss from the butt rot usually does not exceed 3 or 4 per cent. I noticed an interesting thing in the Olympic blowdown. The storm was so severe nothing could withstand it, but all the trees with butt rot were broken off right at the ground level, or ten or fifteen feet above it, and the trees that were sound, without butt rot, were simply torn out by the roots.

### *Troubles with Blue Stain*

L. T. Murray: We have been operating in a stand of old-growth timber for a good many years, with an average amount of visible conk rot and considerable blind conk. The age of the stand is probably two hundred and fifty to five hundred years. What has worried us more than conk rot has been blue stain, which we don't get any scale for. A year ago this spring I attended a meeting in New Orleans where Mr. C. P. Winslow, director of the Forest Products Laboratory at Madison, Wis, gave a very interesting paper on blue stain in fir and pine. He said that blue stain, which is rather prevalent in some localities, really cannot be considered a defect; that it does not affect the strength of the lumber. What can you tell us about that?

Dr. Boyce: Mr. Winslow was absolutely right. Blue stain attacks only the sap wood, sometimes going a little distance into the heart wood in pine. It is brought about by unfavorable weather conditions at the time the green lumber comes from the saw, or when the logs are lying in the woods. Such weather conditions are moist, warm periods. The fungi live on the starches

and foods in the cells of the wood, without destroying the wood itself.

The fact that you get no scale for blue stain is a sore subject with most of us who know anything about blue stain, for the reason that blue stained lumber in mechanical tests proves to be just as strong as lumber that has not been stained. The prejudice against it is on the part of the buyers, which time alone will have to overcome.

Mr. Murray: Dr. Boyce, do you care to say that you feel the timber owners ought to be entitled to some kind of scale for blue stain?

Dr. Boyce: I certainly feel so, but the question is how are you going to get it? From my own standpoint I want to see it used, because it is an unnecessary waste. Of course, when it comes to a question of putting a piece of that blue stained lumber in a fine panel in my own house, I don't want to do it unless I put all blue stain in; but when it comes to using it for structural purposes, for an apple box or anything of that sort, it is perfectly good, and I think the day will come when it will be used.

L. P. Kniskern: I think there is a little misunderstanding in what Dr. Boyce and Mr. Murray have been talking about. The stain I think Mr. Murray refers to is the stain we find in the heart wood, in the center of the tree.

Dr. Boyce: That is what we term red rot.

Mr. Kniskern: It appears in any color from light blue to a deep red. That is a different proposition.

Dr. Boyce: That is the incipient decay of conk rot. We are making an extensive series of tests on the mechanical strength of that type of material. So far it shows that until the white pits appear in the wood the wood is not weakened, but until we get more data we cannot state that conclusively. For all low-grade purposes that wood is perfectly usable. I personally do not yet care to put it into a piece of high-grade structural timber. As a matter of fact, a great deal of it is used. I have been receiving from all over the Northwest, and from one mill in particular, a quantity of material to decide whether this material is decayed or not. It had been thrown out by the inspectors because it was thought to contain incipient decay. In about 50 per cent of the cases it was actually decayed, and in the other 50 per cent of the cases it was nothing more nor less than sound red fir. Now there is a place where the inspector and grader cannot distinguish between the sound red fir and the incipient decay of conk rot.

President Stewart: Is there such a thing as conk rot inside a tree with no opening through the tree to the air?

Dr. Boyce: If you will look the tree over you will find in nearly every case that somewhere along the trunk, even in butt logs, there will be one or two knots coming to the surface. You may go sixteen or eighteen or twenty feet without an opening, but invariably there is an opening.

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President Stewart: We will now hear from Mr. T. T. Munger on "Objectives of the New Federal Forest Experiment Station."

# Objectives of the New Federal Forest Experiment Station

## By Thornton T. Munger, Director Pacific Northwest Experiment Station

FARMING and forestry have much in common. Both depend upon crops grown from the soil, both result in products indispensable to man. Who would say that the wood which gives shelter, fuel and implements is not about as indispensable as the food products from the farm? Agriculture has developed to the highly specialized technical art that it now is from the most crude beginnings centuries ago. It has gone through a process of evolution prompted by changing economic conditions. The use of land for the production of timber—that is, forestry and lumbering—is going through a similar evolution, as the natural result of economic necessity.

The resemblance between the evolution of agriculture and of lumbering is quite interesting. Before the dawn of modern civilization in regions of sparse population, primitive man got his food supply by going out on the prairies and woods and gathering the natural supplies of wild things. He gathered nuts and roots and seeds, shell fish, snared birds, killed wild game. As population increased, the natural supply of foods was overtaxed. The edible roots were dug out to the point of exhaustion, the game was exterminated from the immediate vicinity. There were then only two courses to pursue. Either these primitive peoples must become nomadic and move to new fields where there was a virgin supply or edible wild plants and plenty of game, or they must take steps to artificially grow their food supply. The tendency has been for a people to remain nomadic so long as there was any place to wander to and get virgin supplies of food, and to settle down and grow crops only when driven to it by necessity. In the Old World many centuries ago economic necessity forced the people to depend no longer upon wild supplies of food and so they domesticated the cow, the sheep, the goat and chickens to get meat, milk and eggs, and planted seeds to grow their grains, roots and fruits.

### *Growth of Agriculture*

IN America the Indians were few in proportion to the natural food resources and so they depended upon wild foods almost entirely; they collected camas in the season, followed the bison to its range, gathered berries and even bark. Before the coming of the white man they made little systematic effort to grow their food supply—a little crude cultivation of maize was about all. No longer do the people of Europe or America obtain any considerable amount of their food supply from wild supplies—perhaps a few huckleberries, some ducks and a venison, but even the trout we catch in the streams are artificially propagated. Our corn fields yield many times more abundantly than wild maize ever did, artificially bred up cattle produce meat much more efficiently than wild animals, well cared-for meadows produce grass far better than wild hay land. The agriculture of today is more intensive, more productive than the farming of our grandfathers.

The comparison of farming with forest use is obvious. In this country we have been gathering in the wild virgin supplies of timber. As the supply in one region waned the nomadic lumber industry moved on to a fresh field. There seemed to be such an inexhaustible supply that there was no incentive to do otherwise. In Europe, with its denser population and older civilization, they have long been past the stage of relying upon virgin supplies altogether. They had a taste in some countries, centuries ago, of the dire consequences of exhausting the native supplies of timber. They realized the economic necessity of producing timber and so they have gone about growing wood crops very much as the modern farmer grows food crops. Instead of depending upon an exhaustible natural supply they are consciously producing from the soil a continuous crop.

The same change is taking place in this country. In the East such of the lumber industry as has not followed the supply of virgin timber westward is settling down to depend upon the wood that can be grown. The paper companies realize that to protect their huge plant investments they must cultivate continuous crops of timber adequate for their use, for there is no more "wild" or virgin timber they can gather in. Nearer at home on this Coast some of the redwood people, appreciating the extreme simplicity and evident profitableness of growing redwood, are converting their business from the nomadic

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temporary type of exploitation to the stable fixed industry that a permanent supply of raw material insures.

I venture to say that no one in this room questions that the timber business in this country must eventually convert from the purely exploitation basis to the timber farming basis. No one nowadays believes that our timber resources are inexhaustible or that this country with its increasing population and enormous industrial development can prosper long on the localized and diminishing supply of virgin timber. It is evident that with a shrinking area of virgin forest we have got to grow a second crop, and continuous crops, if we are going to keep up production. The economic necessity is upon us already. As surely as history repeats itself, the treatment of timber lands in this country will go the way it has in the older civilized countries, and the lumber industry in this country will take on the added function of timber growing. We will get away from the idea of cutting and moving on, and instead think in terms of continuous production, from the timber land about a permanent mill, just as the farmer thinks of his 160 acres as yielding its crops continuously.

There is a strong trend in this direction in this country. We do not need to look to China or Greece or other countries that have failed to make the conversion from the pure timber exploitation idea to the timber cropping idea. We have instances closer at home. You know the history of the Lake States and what has happened in the southern pineries in the last two decades. And have you looked at any recent map showing the extent of the cut-over land of western Washington or of the Columbia River region? Do you realize what proportion of these cut-over lands of possible enormous productivity are now utterly devoid of any useful growth?

There is a lot of timber on the Pacific Coast. I do not wish to appear a calamity howler and predict its early exhaustion. It will last a long time yet, but it takes a long time to grow a slow crop like timber.

You gentlemen are concerned primarily with the removal and manufacture of this great original stock of timber. You are in the business of timber exploitation, and there seems to be enough timber ahead of you for your immediate needs. You cannot fail to look at this matter of the use and care of forest land in a broader way—in a way that reaches beyond the immediate future. You look at it as business men who wish to build up a business whose principal investment will not have to be prematurely junked, perhaps as fathers who wish to pass on a productive property of mill plant and timber lands whose capital value has not been negatized because of the exhaustion of the supply; you view this national problem as American citizens in a statesmanlike manner, hopeful of seeing your industry, which is so vital to national prosperity, continue to flourish.

### *Replacement of Timber Vital*

THE Forest Service of the federal government has foreseen that logging without forest replacement is industrial suicide. It has sensed the changing economic conditions which are paving the way for the much more general practice of forestry or timber growing. Naturally it is a matter of public policy to help this movement along that the lumber industry and the public may suffer in the years to come as little as possible from timber depletion and land idleness.

Before forest lands can be put on a basis of continuous production some questions must be studied and answered. We are very ignorant in this country of the methods of cutting forest trees to promote new crops, of methods of brush disposal which are practical and will favor reforestation, of the rates of growth of our several types, of the pests and enemies of our forests whose control is essential to profitable industry. The technical details of how to grow crops of timber must be worked out. Research has done much for agriculture. It is well known how the work of the agricultural experiment stations has increased yields, lessened crop failures, improved breeds, shown the way to control pests, cheapened methods of farm management. Without systematic study of agricultural problems, farming would have been as crude now as a century ago. Here again there is a resemblance between the evolution of the art of agriculture and of forestry. The research that scientists are doing at the agricultural experiment stations has been essential to progress in farming; likewise research is fundamental to putting timber growing on an economic and successful basis.

In the realm of forestry, research is doubly important because the growing and tending of timber crops is relatively a new thing in this country. Research is laying the foundation for forest practice. This must be a good foundation if the business of growing timber crops is to be stable and profitable.

It has been the plan of the Forest Service to establish in each of the important forest regions of the country a forest experiment station where the local problems could be worked out by systematic observation and experimentation. As fast as funds have been made available by Congress this program has been followed. This year it has been possible to establish what is called the Pacific Northwest Forest Experiment Station, whose job it is to find out by scientific research all there is worth knowing about growing and protecting the forests of the Douglas fir region and of the northern yellow pine region. This is by no means the beginning of forest research in this territory. The Forest Service has always carried on some technical investigations in conjunction with its administrative duties. The progress that has marked the care of the national forests during the last 15 years would not have been possible otherwise. The research work to date has been centered chiefly at what has been called the Wind River Experiment Station. The new organization is a material enlargement of the earlier work; it absorbs and continues the Wind River projects. Studies will be carried on throughout the Northwest wherever the problems lead. Though Portland is the office headquarters, the forest land of the whole region is our laboratory.

### *Growth per Acre of Douglas Fir*

I WOULD like to tell you a bit about the line of investigation already under way. This past field season we have been trying to answer the question, How long does it take to grow a crop of Douglas fir? Or, expressed differently, What is the growth per acre of Douglas fir for every soil and climate of the region? If one of you timber land owners is laying plans to hold your land for successive crops you naturally want to know what returns you can expect. Some information on this subject has been available for some time. Now we need more particular information covering every variety of conditions met with in the region. A party has been in the field all summer measuring typical so-called second-growth stands from 40 to 140 years of age on all types of soil and in the various climatic zones of western Oregon and Washington. This project will be continued another season at least, and will not be closed until we are in a position to say with a good deal of assurance how much timber the several soil types of the Douglas fir region are capable of producing under proper care, how many trees per acre there should be for maximum results and what their sizes will be at every age during the rapid growth period. With this information land owners can figure in a businesslike way what gross returns timber growing will bring.

It is often said that in these western forests fire control is 75 to 90 per cent of forestry. There is a great deal of truth in that. We must get the upper hand with fire, and first we have got to learn how to do it. Forest protection is not a matter of brute strength and awkwardness, or even of alertness and perseverance entirely. There is much technique to fire prevention and suppression yet unlearned. There is a big field for research in fire control. Fire studies have been made one of the major responsibilities of this new experiment station. Investigations are being carried on to correlate the behavior of fires and the weather. Knowing that and knowing of the approach of fire weather, through the Weather Bureau, forest protective agencies will be in a better position to control this menace, for being forewarned is being forearmed. Last year at this Congress Dr. Hofmann told you of his findings about the connection between the humidity of the atmosphere and the behavior of fires. The understanding of that principle has already been an immense held in handling the fire problem. It is the hope that further systematic critical study of our fire problems will help to show the way to absolutely control this menace. Scientific research has shown the way to control many of the plagues that menace human life—like yellow fever, smallpox and typhoid; is it not quite as reasonable to expect that research can find out how to control the forest fire plague?

At present the timber cutting and the brush disposal on private lands in this region is done without thought of forest replacement. Some reforestation takes place, very fortunately: nature is so prolific and persistent. To be sure of getting abundant reproduction of the right kind of trees after cutting, some special provisions must be taken in the methods of logging and in brush disposal. It is not enough to trust to chance. In growing timber crops it pays to have full stands of good trees. Loose, scattered groves of scrubby trees, blanks in the forests, or trees of an inferior species don't pay. As in agriculture, the successful farmer tries to get the highest yields on the smallest aggregate. Agricultural research is devoting its attention to getting the most eggs per hen and the maximum yield of butter fat per cow. So in forest research, it is important to find out the way of cutting the virgin stand and disposing of the slash that is going to give the most valuable second growth. We must know every detail of the life habits of each species—how far it scatters its seed, under what conditions it is windfirm, what type of ground cover it needs for germination, how grazing affects the young growth, how many trees per acre give maximum growth at each age, how various types of slash disposal react on reforestation, and dozens of other points I might mention.

### *Forest Management to Increase Yield*

IT may be presumptuous to say that man can improve on nature, but he certainly can if he goes about it. Under proper management men can produce more wood per acre than nature has in the wild stands. Do you realize that the average stand in the whole Douglas fir region when the white man arrived here a century ago was only about 30,000 feet per acre, yet the forest had developed in a state of nature for countless centuries. With systematic forest management—such as the ultimate forest land should have—it will be possible to get more uniformly stocked stands, to avoid patchy forests of open grown trees, to lessen the enormous loss from decay as well as fire. The protected forests of the future should then make very much fuller and better use of the land than the virgin woods have. They can be made to yield more for their age than the virgin woods have.

These are the principal broad lines of work which the experiment station now has under way—to find out what our Douglas fir land will yield under management, to better the technique of fire control, and to work out practical methods of cutting and slash disposal that will result in the most successful reforestation and successive crops. I have outlined them to give an idea of the kind of problem that the timber industry of this country faces as it enters upon a new era in its evolution, the era of timber growing simultaneously with timber use. These problems this organization of the Forest Service is created to help solve. They are problems which concern the private owners of timber land quite as much as the federal or state governments or the general public. More than two-thirds of the timber land in the Douglas fir region and all the mills, logging railroads, etc, are in private ownership. The reforestation problem involves a vast amount of private capital. Our work will be directed, therefore, even more to working out these problems on private land than on the national forests. This forest experiment station is created to serve the industry for the public welfare. To make its work most effective there must be many points of contact, a free interchange of ideas. Your suggestions as to what this department can do and how it should do it to be of greatest service in the cause of timber growing are solicited.

### *Advisory Council to Be Appointed*

AS a means of establishing a permanent contact between the industry and this research organization there will be appointed within the next few months an advisory council of a number of lumbermen and timbermen which will meet at least annually and systematically discuss the program of work of this station. This council, acting in an advisory capacity, will have great influence in directing the lines of endeavor which the station pursues and keeping them in accord with the practical permanent needs of the timber industry.

In closing I wish to invite you all to call upon this forest experiment station for any data or advice on reforestation matters that you may need. Perhaps we can aid you; perhaps not. We will if we can. As the work progresses we hope to have more and more cold facts and reliable conclusions about the business of growing timber, and we want the lumbermen of the Northwest to have immediate access to these results.

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**Committee Appointments.**

President Stewart: We will now give the personnel of the nominating committee and the resolutions committee.

The members of the nominating committee will be: Joseph Irving, chairman; E. J. Gaffney, A. H. Powers and Russell Richardson.

The members of the resolutions committee will be: R. W. Vinnedge, chairman; Fred R. Olin, E. C. MacGregor and J. P. McGoldrick.

On the program you will note several subjects for informal discussion. The first one is "Slash Disposal for Fire Prevention." and I would like to call on E. C. MacGregor, of the Boise Payette Lumber Co., to give us his ideas on this subject.

# Slash Disposal for Fire Prevention

E. C. MacGREGOR: In our operation we burn the brush in the spring, if we can, and in the fall also. The cost is approximately 1 cent per thousand. We don't pile it.

President Stewart: Do your ideas and practices agree with the Forest Service and state officials?

Mr. MacGregor: Not entirely so. I think they would rather have us pile the brush.

President Stewart: Would there be anything gained by piling the brush? They do it in some place, I believe.

Mr. MacGregor: I think it would, but the cost would be prohibitive in our operation.

President Stewart: How much would it cost?

Mr. MacGregor: Approximately 75 cents to $1 per thousand.

William Leuthold: Mr. MacGregor, what percentage of the small trees left are destroyed in this operation?

Mr. MacGregor: In the way we burn we destroy but a small percentage of the trees, because we burn on open hillsides where there is not much reproduction. Much of our country has little reproduction on the south and west slopes, where our greatest fire hazard exists, because our thickest timber grows on those slopes.

Mr. Leuthold: Where you do burn it that way you kill the young trees, don't you?

Mr. MacGregor: Not if you burn early enough in the spring. Some of them looked pretty brown after the fire, but lots of them pull through. Of course the little trees just starting through the ground burn.

C. S. Chapman: How much of the area do you burn, Mr. MacGregor?

Mr. MacGregor: We burn approximately 50 per cent of all the ground we log.

President Stewart: Is Mr. Long here?

J. A. Long: Mr. MacGregor has covered about everything I have to say. Later on, if it is necessary, I will make a statement and give it to The Timberman.

President Stewart: Is Mr. MacGregor's statement of cost of burning the brush and piling it approximately correct?

Mr. Long: Very close.

President Stewart: Is there anyone here who is cutting timber under government regulations?

E. O. Moore (Deer Park Lumber Co.): We are cutting on reservation land, where we are required to pile and burn all brush. We even have to lop the tops. We also pile it where it won't hurt the young growth. It costs us 35 cents a thousand to pile and burn.

President Stewart: What stand per acre of timber?

Mr. Moore: Ours runs eight thousand feet per acre. We have to pile and burn down in the swales. as well as on the hillsides. We have worked our costs down to where we get just as good a job at 35 cents as we did years ago when I believe we paid 75 cents.

President Stewart: Do you have any difficulty in getting along with the forest officials?

Mr. Moore: Not a bit. We just let them have charge. We let a contract on it usually, and then let the officer in charge have the say to the man who has the contract. We never have any trouble or any difficulty in getting it done. Brush can be piled and burned, and it doesn't make any difference whether it is thick timber or not, for 30 cents. Where you do that your ground is in much better condition for reforestation than where you make a broad burn, because the latter sours the ground and requires a good many years to get it back into condition.

President Stewart: When do you burn the brush that is accumulated?

Mr. Moore: We pile as we go along and we burn about the first of November.

E. R. McCory (A. C. White Lumber Co., Bonners Ferry, Idaho): The Forest Service does not allow us to do our own piling; they do it for us and charge us $1 a thousand. Occasionally we get back a small rebate. We have found brush disposal a very expensive proposition. We are also required to leave seed trees. The way we burn does not kill the young growth.

President Stewart: Are you acquainted with Mr. Moore's territory?

Mr. McCory: Yes.

President Stewart: There is quite a difference in cost between 30 cents and $1.

Mr. McCory: I think our stand is possibly a little heavier per acre than his.

President Stewart: We have the subject of "Log Grading Before Bucking." This perhaps will appeal only to fir operators. Mr. Murray has had some experience on that subject.

# Log Grading Before Bucking

L. T. MURRAY: Operators on the Pacific Coast during the last few years have given much thought and study to the marking of logs by the buckers, realizing that the average bucker in the woods is not in a position to take time to study the log. We find that it pays to have a man to do nothing else but marking. A tree improperly marked will mean a loss of $20 to $50 in log values to the independent logger. It does not make quite so much difference where the operator is manufacturing his own logs. Many

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of the old-time buckers are capable of marking logs and will get all the clear they can. But the new generation does not seem to have that instinctiveness. We generally have one marker for every two or three sets of fallers, and we find that they even get slack once in a while, and we discover a bucker with a marking stick. I get over the woods quite a bit and point out glaring examples every now and then of logs being improperly marked. As a general rule, where a log is improperly marked, both grade and scale are reduced. In making a mark ahead of a big knot or a bunch of knots you not only reduce the grade of the log but you get a very much smaller diameter on the log. Once in a while, just as a matter of discipline, I have them go out and cut off six feet and throw it away and still have more scale, and of course a better grade.

President Stewart: This subject is important to anyone who sells logs on grade. In our own operations I have seen many times a 32, 36 or 40-foot log, in which the top eight feet was unquestionably a No. 2 log and the remainder of the log a very fine No. 1. When that log goes to the mill and doesn't happen to be long enough to make two logs, the mill certainly loses through the fact that it has to take eight feet of common lumber on the top end of a perfectly good No. 1 log and make common lumber out of it of such a short length that it is not very salable. I don't think this subject should be looked at only from the standpoint of the logger trying to improve his situation, because if it is properly used it will also help the mill materially.

Mr. Murray: The judgment to be exercised in marking is not altogether as to grade. In our instructions we stipulate certain desired lengths, and we want to cut a tree to get all of those lengths possible without cutting down on grade.

### *Marking Important in Big Timber*

R. W. Vinnedge: We are operating in large old-growth yellow fir, and until the present year we have never used a system of marking and grading. Now we have a system which provides one scaler and marker for every two sets of fallers. At one time this year we had eight scalers and graders ahead of our fallers and buckers. We found that we not only gained in grade, but we gained materially in the length of the log. Any of you who will go out in the woods and measure your logs with a steel tape will find that the variations due to the differences of judgment by the buckers, when they are marking their own logs, will, in a month's time, lose you a good many thousand feet of merchantable timber. At first we started with one marker and grader marking for four sets of fallers. This is a physical impossibility. We found that they were careless, and that we were not gaining much in the accuracy of the lengths. With large, old-growth timber you can readily see that that is a bigger factor than with smaller timber. We have had to check them up constantly. It has been a very difficult thing to get the right kind of a marker, a man who understands bucking, particularly in rough and rugged country, where the lay of the tree many times makes it difficult to buck. If the bucker is left to his own designs he bucks that to suit his own convenience rather than with regard to grade and length.

We have a system of checking up every week. The superintendent goes out with a steel tape and checks these men up. We have been operating on this system for three months, and it has been only until lately that we have seen any uniformity whatever in the marking of the logs. We have, through our experience, set an arbitrary over length for logs from 24 feet up. We tell them to buck the logs five inches over, and we find even now, as much as we have watched it, that many times we get down below the even foot figure. One result we find is an increase in the number of short logs, and it is quite obvious that that would result, when you have an eye to the grading of the tree in the marking of it for length.

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Now as to the way the mills accept this, of course a mill always wants long lengths; they are continually crying for 36-foot and 40-foot logs. The fact remains, however, that during the first two months of the operation of this system we were not operating our mill and were selling our logs on the open market, and I was particularly anxious to find out how these manufacturers felt about the shorter logs. Of course they complained, but they also admitted that the shorter log when properly graded facilitated their operation. If a 40-foot long is on the carriage, particularly if they have clear orders to saw and are looking for a No. 1 log, it increases the cost of manufacture and results in a great many more short lengths in the yard. I think, generally speaking, the mills will approve and welcome a more intensive grading of logs.

# Oil vs. Wood for Donkey Engines

PRESIDENT STEWART: We will go to the interesting subject of "Oil vs. Wood for Donkey Engines." Most of us have had some experience with at least one of them. Mr. Vinnedge, do you use oil or wood for your donkey engines?

R. W. Vinnedge: We use oil.

President Stewart: Have you any comparative figures on the cost of the wood versus oil?

Mr. Vinnedge: We have no figures, but we have a mental reservation, however, that the oil, particularly since the last increase, is much more expensive than wood. But taking into consideration the elimination of the fire hazard, which is an unknown quantity, we still feel we are justified in the added expense of burning oil. There is, too, a factor of increased efficiency with oil which is a very definite one. Some operators have, and we had for a time before we installed oil, a wood yard centrally located, to which we brought all of the wood logs and sawed them up with a drag saw. We let a contract for sawing our donkey wood and our blocks and stakes. We found that that was a very economical and satisfactory system. A centrally located wood yard will permit you, from your loading track, to load the stakes and the blocks and the wood for the donkeys on the flats as they are taken into the woods. But in our country it is very rugged and steep, and there is an additional fire hazard, so we have been using oil.

We have tried two different burners, and we have eliminated the automatic burner entirely. We have now the Jenkins type. We ran a test on the first burner we installed on an 11x13 Willamette yarder, and we found that the new burner, which required a man to be constantly at the throttle, saved us between two and three barrels of oil a day. On an ordinary 11x13 Willamette our average for oil per day was about eight barrels, and now we get as low as five and six barrels a day.

President Stewart: What does your oil cost you at your camp, Mr. Vinnedge?

Mr. Vinnedge: Our present contract is $1.65 and 43 cents freight; that is $2.08.

President Stewart: Mr. Kniskern, are you using oil in donkeys?

L. P. Kniskern: In some of them. I have no definite figures to give you.

President Stewart: I think this subject could well have been coupled up with the matter of electric logging, because the question of burning oil and using steam for power directly as opposed to electrical logging is certainly a problem worth thinking about.

A. H. Powers: I think Mr. Donovan may have some figures on oil. He is burning oil in his donkeys.

J. J. Donovan: We have changed from wood to oil everywhere in our works. There may possibly be one or two engines at Skykomish that are still using wood. We found the Goodyear

*Logging in other days*

people, whom we bought out last fall, burning wood in their donkeys. We changed to oil, not perhaps so much because we could figure out an actual gain in dollars and cents, but partly because of the certainty that it was safer and because we found that the stained and the rotten logs that were supposed to be used for fuel actually got on the cars, and nearly No. 1 clear were being used for fuel.

I have a few figures in regard to the cost of oil that rather surprised me when our purchasing agent gave them to me the other day. We have two camps that burn oil in donkey engines and locomotives, one where the highest elevation reached by the locomotives in climbing from the lake is about five or six hundred feet, where the average round trip is perhaps eighteen miles and where the logging conditions are pretty favorable. Now the cost per thousand, with that camp producing something over 40 million feet last year, was a trifle over 20 cents. I did not charge my memory with the exact figures, but it was 21 or 22 cents per thousand for the yarding and the locomotive. All the oil that was sent into camp in dollars and cents divided by the number of feet gave less than 25 cents a thousand. This first camp is our Alger camp. At the other camp, our Saxon camp, where at the present time we wind on 5 and 6 per cent grades for long distances, reaching up to elevations as high as 1800 and 2000 feet, and where some of the logs have to be swung, and where practically all the ground is rough, the cost per thousand for the same year for a 20 or 25 per cent less output than for the Alger camp was 70 cents. I think a large part of the increase at the Saxon camp was due not so much to the use of oil in yarding as it was to the long, hard pull the locomotives had to make to get up the hill, although the loads all came down. But even empty cars going up a hill like that take a lot of power to lift them.

# "Chips and Bark"

## By J. J. Donovan, Bloedel Donovan Lumber Mills

WE had some technical subjects this morning, very well presented. I think all of those who listened learned things that were worth while. I know that the two gentlemen from the Forest Service, who talked to us about the diseases in Douglas fir, added a lot to the amount of knowledge that I have; and the little discussion by Mr. Vinnedge on the matter of having proper markers and graders in the woods for directing the buckers and fallers—those few remarks, I think, we may well take home and act upon. We have been acting in our own operations in some degree in the same way, but I think perhaps we need to act a little further and investigate a little more carefully, and perhaps have the boss go out in the woods once in a while himself with a steel tape and see what is going on.

I have been coming to these logging congresses ever since the first one at Seattle, at which there were only about 70 all told registered. The number has continued growing, and the field that we cover has continued expanding until now I consider this the best representative gathering of any trade or profession that there is on the Pacific Coast; and by Pacific Coast I mean Oregon, Washington, California, Idaho, Montana, British Columbia, Arizona and New Mexico. And the beauty of these gatherings is that we come partly for the social intercourse, partly for the technical knowledge and partly for the day in the woods when we all get a little better acquainted than we ever were before and go home wondering why we ever missed a Logging Congress. But to me the fact that I can meet the newspaper men and some of the loggers like Al Powers, Ed English, and like George M. Cornwall, who thinks he is a logger, and a lot of others, and call them by their first names, the same as we do in the Rotary clubs and among old school friends, is to me one of the most valuable parts of these gatherings—the personal touch, the friendship, the acquaintanceship. And you all know that this gathering is unique in another thing aside from this matter of friendship; it is unique in that in these fifteen years or fourteen years we have been in existence we have come back each year, every man of us anxious, if not on the program then in private conversation, to tell the rest of us if we really have made any improvement, if we have learned something during the past year, and to give that freely to the rest for the benefit of the profession. And while, of course, we sometimes inquire as to how business is, and as to whether you are really able to meet your payroll and your bills and have anything left when you are through, which has not been the case in the combined logging and lumber business since the first of last April, yet there is less business in the ordinary sense talked in these meetings than in any meetings that I know of. We have no combination; we have no arrangement for fixing prices. But as to men and methods, relations with employes, relations with your foremen, new methods, protection against fire, cooperation with the government, state and national—all those things have been promoted immeasurably by these gatherings.

I feel that the increasing numbers of the younger men, the engineers, the superintendents, the foremen, and even some of those we usually consider as the rank and file that come here, like it and think they get something out of it, is a very, very fine thing.

### *Possibilities of the Diesel Engine*

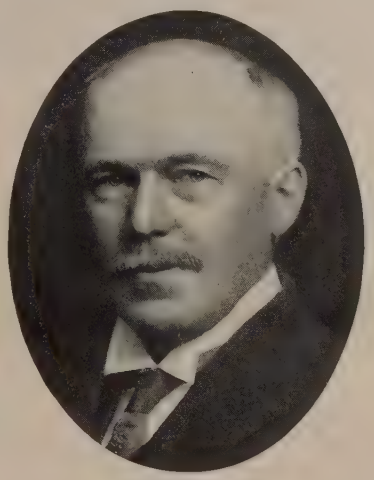
WHEN Mr. Stewart first wrote me he said he wanted me to talk about Diesel engines. Several firms joined together and tried out a Diesel engine on our works last year. It did work. It did haul in four or five hundred thousand feet of logs; and while it was a failure from an economic point of view, that failure was not due to the principle; it was due to the fact that that particular Diesel engine was not well constructed and did not work smoothly. When the particular Diesel engine for logging work is produced that can be relied upon eight hours a day without stopping for repairs or readjustment, as is the case with the Diesel engines for stationary work and for marine work, you will find that there is a place—I expect to see it within two or three years—in the woods for Diesel engines equal to the place that electricity now fills. I recall a few years ago, when Al Powers was about the only man that had the nerve to experiment with electric engines, some of the ungodly men around his engines used to stick in 40-penny wire nails instead of fuses in order to make the thing hold up until it would burn something. We now realize that he was a pioneer, that the work he did was of great value, and that there are many electrical equipments running now that are doing good work and, in their special places, are probably more economical and better than steam or gasoline or ultimately Diesel.

A point was called to my attention in a letter from George M. Cornwall the other day. I am told that the electrical control of the tension on the yarding line is so reliable, the overstrain so much less than in ordinary steam operations, that the life of the wire is fully doubled. Thus the cost for cables in an electric operation is only about one-half per thousand feet of what it is in the ordinary steam operation. And I have been told further that the steam engineering men have no suggestion to offer in that respect, excepting for the engine to blow off steam at a certain pressure on the throttle That is not a good way to govern that.

The Diesel engine has the same advantage on cable that the electric engine has. When your wire bills are running $40,000 to $50,000 a year, as ours are, if you can cut those in two you can afford to spend some time in trying out new things.

### *Progress in Logging Methods*

I THINK our loggers of the Pacific Northwest have been very progressive in trying out new things. For ten or fifteen years after we got through with horses and bull teams the greatest advance made was the changing of the sizes of the engines, adding to the number of drums and increasing the size of the cables. Then about eight years ago we made a big jump into the high lead, which is now in such general use,



J. J. DONOVAN

and ever since have been changing something of importance every year. The use of skidders, the evolutions of the Lidgerwood skidder, the Tyler rig, and other special rigs, by which we are trying to get out the timber on the rough ground up in the hills, get it to the cars without smashing it all to pieces, bringing it in and being able to sell it to the mills at a little profit, and at the same time not to leave too great a proportion in the woods, is perhaps the most marked development of recent years. In these units, where we have a loading engine and yarding engine, heavy cables, four or five drums, water tanks, oil tanks—and the tendency again is for oil tanks to increase in size so the engines don't require so much waiting on—we have carried the load to the point where we are breaking down our track and bridges, and we have got to spread that load onto two cars; and I think that is the next thing most of us will be doing.

When I called this talk, in answering Mr. Stewart's letter saying he must have something, "Chips and Bark," I did have in mind, looking out from my window, the waste that comes from our mills and from every mill. Our Forest Service friends give us the most astounding figures as to what we actually turn over to the ultimate consumer out of a tree. Some of those figures are as low as 25 per cent, measured by volume or by weight, and none of them are over 30 per cent. Now that does not mean, gentlemen, that you are wasting 75 per cent or even 70 per cent. I claim that out of this gathering of men in this room, today not 10 per cent of you are actually wasting anything of the tree, or the mills either. Why? Because in the forester's 100 per cent is included every part of the tree, the branches, the leaves, the knots, the bark, the sawdust, many of which have at the present time no economic value whatever. And I say there is no waste when you are using all of a tree that you can cut and dispose of and get back a dollar and one cent for every dollar that you spend. The analysis of 39 mills, furnished by the West Coast Lumbermen's Association for August, shows that we got back 99 cents for every dollar that we spent in that month. For the first eight months a similar analysis for those mills shows that for every dollar we spent we got back eight-tenths of 1 per cent profit—eighty mills. We are entitled to a better return on our standing timber and on our work and on our capital than that. The question is, how are we going to get it?

We have an enormous pile of waste at our Bellingham plant, and also at our sawmills at other points, although we sometimes have put men on to pick out stuff for lath and for fuel and we have shipped all over the country everything we can sell, but there is still a pile of material. When you see it burning at night you think it is equal to all the product of the mill. Possibly it is almost equal to the finished product, if I may judge from these figures that my Forest Service friends give me. The question is, are we ever going to save the things that are in that waste, and be able to do it without spending more money than it is worth? I have been associated with practically all the different attempts that have been made up in our section of the country, and have co-operated as I could with the University of Washington, Professor Benson and Dr. Winkenderder—Dr. Benson, of the chemistry department, has had the most to do with it—and have helped spend some little money.

### *Waste Problem Yet Unsolved*

TWO years ago I met Mr. Benson on the street. I said, "Doctor, just one question: Have you yet found any way at the university where you can get out of this waste, or any part of it, a dollar's worth of value without spending more than a dollar to get it? And he said, "No, we have not, Mr. Donovan. " But I have reason to think that we are on the dawn of a new era in regard to sawmill waste. Professor Stafford, of the University of Oregon, is above all, the man who has solved the problem. If he has we will not only take off our hats to the college professors in general who have been kind enough to come to our gatherings and help us solve our problems, but to Mr. Stafford in particular for his service in this matter. I hope he will make a fortune out of it, and I think he will. Henry Ford is building, and has nearly completed, at Iron Mountain, Mich., a plant costing between $500,000 and $600,000 where all this waste is handled automatically, where all the values are taken out and saved, and where, unless all signs fail, it is going to be possible to do this thing in such a way, though it may take a few years, that the waste pile of the sawmill will earn a great deal more money for the company than the main production. You have heard what the smelters at Cardiff, Wales, do. They buy ore, and partly smelted material all over the world, and they say, "We will give you all the gold and silver that there is in this ore, or in this slag, or whatever it may be, if you will let us have the other things that we may save." I can hardly hope that anyone will come along and say they will pay all the expenses of our sawmill and give us the finished lumber if they may have the waste and apply the Stafford process to it, but if half what I have been told as to the results Henry Ford is going to get is true, that is about what we are coming to.

The sensational magazines, the writers who get $1000 if they can get up a new yarn, have repeatedly stated for the benefit of the consuming public that the lumber barons of the Pacific Northwest were making great fortunes at the cost of the general public. Some of us have managed to get a new suit once a year and plenty to eat, lots of hard work, employ a lot of men, find the money to pay them, and up in our state of Washington furnish half the payroll of the entire state, according to the industrial insurance commission. You do almost as well here in Oregon. The fact is that the manufacture of lumber, from the time you cut the tree until you ship it by rail or by vessel, is the great, big, overmastering industry of the Pacific Coast.

### *Timber Taxation and Reforestation*

WE are troubled sometimes to know whether this is going to last very long. Twenty years ago we had a very distinguished gentleman, Gifford Pinchot, tell us that there was about 20 years' timber supply left in the United States. I am not going to take up all the different statements that have been sent out by the Forest Service since that time, because from the antagonism between the loggers and lumbermen and the Forest Service there has come to be in recent years, very happily, a complete co-operation and understanding. I am only mentioning this matter as showing that it was possible in those days, with imperfect surveys, to make very serious mistakes. Those mistakes have largely been corrected, and I think the recent reports show that Oregon has about 100

years' supply at the present rate of cutting. Washington, which for a number of years has led all the states of the United States in the actual production of lumber, and which is producing now considerably more than the state of Oregon, has only 50 years' supply left if we cut at the present rate. Most of us in Washington think that we have reached the maximum, and we realize that last year there was probably the largest amount of lumber cut in that state that we have had in the past at any time or are likely to have in the future. We are cutting less this year. Government reports show that for the whole country, at the end of seven months, I think it was, we were nearly half a billion feet behind the cut for the year 1923. But this fear that we won't have any wood to build houses with, or, according to some people, even to build our fires with, is, in my judgment, groundless. Nature is growing trees pretty rapidly; she is growing them certainly enough to take care of the wood, fence posts, telephone poles, telegraph poles, piling, and all that. But our tax systems are such that for me it seems impossible for any private enterprise, no matter how well it may be disposed, to undertake producing trees as a crop, as was suggested by Mr. Munger this morning. I have been serving on committees for twenty years with some of the best men in the country, trying to see whether we could not develop a public sentiment that would be reflected in the legislation of the Pacific Coast states that would make this possible. No such legislation has as yet resulted. The people of the different counties, the tax assessors and the county commissioners realize that timber is a single crop; the men owning it are not going to allow it to be sold for taxes; but they have continually increased the tax until the tax collector and the power that is behind him is today the worst enemy of reforestation and of the lumber industry; and it is because of this tremendous tax burden that all the mills are running whenever they can, many of them two shifts, in order to manufacture the lumber and get something out of it before it is all confiscated.

I am not prepared to speak for the Weyerhaeuser Timber Co., and what I say with reference to that particular company is hearsay and my own observation. From hearsay I was told more than five years ago that the annual taxes paid by that company was over a million dollars a year. I have no doubt that is true. They bought the old Northern Pacific land grant, paid a price that the Northern Pacific was very glad to get, and then proceeded to sell standing timber and finally to cut it up. They have several fine plants that you are all familiar with: Snoqualmie Falls, two plants at Everett in operation, and a third rapidly approaching completion. They have their own logging enterprises at various points. And they have made possible the great enterprise at Longview. They have sold great bodies of their timber to the Long-Bell people to cut up, because they themselves could not cut it up fast enough to escape this confiscatory process. We should be able to cut our timber and sell it for at least from 6 to 10 per cent profit. When we can't do that we ought to be in a position to slow down without having to give away our property in order to meet the taxes thereon.

### *Taxation Methods of British Columbia*

WE have a lot to learn from our neighbors in British Columbia about how to handle standing timber with relation to taxes. They have a way there when their royalty seems to be pressing too hard of getting together the cabinet, the prime minister, the premier and the loggers, talking the thing over from a business point of view and adjusting it in such a way that the loggers will not be driven to cut the timber when there is no demand for it. But in all the states on the American side we are in the same fix. The public is demanding that the one crop shall be treated as if it were an annual crop and taxed to the limit, and it is being done.

I am not, as the popular phrase is, Mr. President, squealing; I am simply stating a thing that I think every man who is listening to me will agree to in some degree. Some of you are hurt worse than others. But right there is the main reason why, I am certain, that one of the new mills at Everett which I spoke of was built, and why the mills now in existence at the time there is not a good demand for lumber are forcing it on the market in order that they may secure tax money. It is not a proper or healthy condition for the greatest industry on this Coast to be in.

I saw this in one of our lumber journals. It is a dispatch from Beaumont, Texas, dated September 29, 1924:

"After an uninterrupted operation of nineteen years, the big sawmill plant of the Alexander Gilmer Lumber Co., at Remlig, Jasper County, will cut its last log on October 15.

"H. S. Filson, president, said the company would not attempt reforestation of its cut-over lands. Taxes are already too high on this class of land and absolutely prevent private concerns from undertaking the expense of reforesting, which he believes can be carried out successfully only by state or federal financing and management or by a joint handling of the project by private owners, the state and the nation."

I think that man is sensible. He has probably done better to get rid of his land as best he can rather than to attempt to reforest, have a lot of anxiety for himself and his heirs for the next fifty years, and then probably have it confiscated.

As things stand today there are just two agencies that can reforest under existing laws in the United States, in the Pacific Northwest, including California; they are the states and the nation, with possibly the exception that proves the rule, that under special conditions in the redwoods they may be able to do some private reforestation. This is my judgment after giving this matter a lifetime of consideration.

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President Stewart: My company certainly knows the big handicap which the lumber industry is under by reason of the high taxes which we have to pay, which are out of all proportion, I think, to the taxes which are paid by other properties. All of us in our home places could no doubt exert some influence on this taxation problem if we would. The next subject is an old-time one, "Yarding Logs—Skyline and Skidders vs. High Leads and Ground Logging."

# Skyline and Skidders vs. High Leads and Ground Logging

W. A. ERWIN: On the back of the program is a very fine piece of poetry. The first two lines I wish to refer to:

"Many a tree is found in the wood,
And every tree for its use is good."

Many a donkey or logging engine is found in the woods, and every one of them for its use is good. I don't believe that there is any skyline rig, skidder, high lead unit, or any other kind of a machine built today which is the best rig for every condition. We all have our problems; we all have our different logging shows, and different conditions under which we log to try to make an honest dollar, and each show requires a certain machine; or, I will say, some machine will probably do the job better than other machines will.

As a general thing, I feel that up to a thousand feet in ordinary logging a high lead is probably the most economical machine that can be used, but when we reach out over a thousand feet or reach out distances which require two donkeys, that a yarder and a roading donkey, if the ground conditions are right and the timber not too large, I think a skidder has them all beat. I believe a skidder, compared to donkey engines, and considering hauls beyond 1200 feet, will log anywhere from a dollar to two dollars a thousand cheaper.

### *Valuable in Hemlock Operation*

My problem is the skidder problem throughout. We are logging hemlock; we get 90 per cent hemlock. Pulpwood is what we are after. With donkey engines we can't haul the smaller logs and do it profitably. All of us are familiar with the amount of waste that is left in the woods today, and the reason we don't take that out is because we feel we can't do it with donkey engines and do it economically.

I realize that everybody who is making money in the logging game is successful; that is, the test for success is to be able to make it pay; and for me to try to tell you people who are paying the bills and paying dividends that you are not logging correctly because you are not using a skidder, would be foolish.

I am in favor of the skidders in our show or our proposition, but that does not necessarily mean that the skidder is the proper thing for your show. It is up to you to decide. We all know what different machines will do. I think in the near future there will be developed a machine which will be a combination of the high lead machine and the skidder. I think that machine will be on the market this coming year. Such a machine, it seems to me, will be able to log under any and all conditions. I believe it is going to be a great thing. I will be glad to see it come out.

L. T. Murray: I think what Mr. Erwin said is entirely true. We all have our different conditions. A skidder is good in one place, a high lead in another; and, as a general rule, if you have the kind of a show you want, I think the majority favor the high lead. About a year ago we opened up a new tract of timber that consisted of what we considered very small stuff. We had been logging in big timber for a good many years, averaging about 1500 feet to the log, in very rough country, and we used a skyline system. Now we are logging in timber that runs about 500 feet to the log and on a whole lot better ground. When we commenced to think about the kind of equipment we were going to put in that operation I gave quite a considerable amount of thought to skidders of different kinds, principally the interlocking type. We figured on using a tree rig or tower rig. We finally decided on high leads, and I think probably the main reason we decided on high leads is because we were used to them. A lot of other loggers said that we had an ideal skidder show. The ground is not real rough, neither is it real level, but it is small timber. After we had logged about three or four months, with all brand new machinery and our conditions all new, and that sort of thing, I got to wondering whether or not we had made a mistake in not getting the skidder type of equipment, and it worried me a whole lot. We were able, in some instances, to yard faster than we could load, and we thought by having the skidder type and the steel spar we could use the boom loader and do away with our loading troubles. When we would run up against a piece of timber where it was very small and scattered, and it seemed an awful expense to stick out a machine and swing away from it seven or eight hundred or a thousand feet; and, as I said before, I got to feeling that we had probably made a serious mistake in not having gotten skidders. But three or four months followed and we seemed to be able to accustom ourselves to the new condition, the small timber, and now we have gotten down to where if a fellow asked me today whether I thought I had made a mistake and he recommended a skidder to me in my country, I would tell him we did not make a mistake and that the high lead in our country today is getting cheaper logs than we could get with a skidder, by reason of the fact that we have a much smaller working unit. We don't yard so far. We have to build a little more railroad, and our railroad is not especially cheap; still, it is not very expensive. But we have a small crew of men, not much more than half the number of men ordinarily required on the ordinary skidder; and while we don't get quite so many logs, those we do get we think we get cheaper than with a skidder under those same conditions. I would like to have somebody who has been over in my operation tell me whether he thinks differently.

Mr. Erwin: You are yarding direct to the track, are you not?

Mr. Murray: Yes.

Mr. Erwin: You are not using the donkey engine as a yarder out in the woods?

Mr. Murray: Only occasionally. Sometimes we have to do that to save building an expensive piece of road for a small patch of timber.

Mr. Erwin: Probably 90 per cent of your logging with a donkey?

Mr. Murray: About 80 per cent.

Mr. Erwin: If your ground conditions were such that you could not get your logging spurs close enough together so you could yard with one donkey and had to use a yarder a great part of the time, probably the skidder solution would have been better for you.

### *Where Skidder Could Be Used*

Mr. Murray: I think it would. I think we generally get our railroads from 1000 to 1500 feet apart and put our spar trees about 1000 feet apart on the branches, and if we had a great deal of country where we could not get our railroad within that distance I think the skidder would be the proper rig, although we do have a show where either one could be used and produce good results.

Mr. Erwin: You are lucky then to have such a show.

President Stewart: Mr. Murray, will you tell us what your average input per man per day is at this duplex camp?

Mr. Murray: For the last two or three months we have been averaging about 1700 feet per man per day. We started at the beginning of the year with about 1300 feet per man and have been working that up to about 1700 feet per man.

President Stewart: That includes every one on your payroll, I take it?

Mr. Murray: That includes every one on the payroll, the booming crew, our engineers, our grading and our track laying and everything.

G. B. McLeod: What is your yield per acre?

Mr. Murray: About 40,000 feet to the acre average. Some one asked me the other day if

I could keep that average up. I told him that I figured that we ought to keep better than an average of 1500 feet per man right straight through. That, of course, is exclusive of our main line, which we had to put in before we got to logging in the first place. I think the input per man per day is of course what counts, and it is a good way to compare any system; but, on the other hand, in that rough country I think you get a greater input per man with skidders than you would with the high lead. I might say further that we have probably fewer men. It is a sort of a hobby with me to cut out men wherever it is possible to do so. For instance, on our high lead units we don't use any fireman, wood buckers or splitters, or anything of that sort, because we burn oil all the way through, and there is a saving of eight men right there on our yarding crew. We only use 13 men on each yarding crew. Of course we have an expense there in fuel oil that otherwise would mean men if we were burning wood. The big thing is, if there are any delays that payroll is not going on.

### *Prefers High Lead up to 1000 Feet*

George D. Newbegin: We figure that the high lead under certain conditions is the best log-getter up to 800 or 1000 feet. After you get beyond that you have to adopt some other method. We are in favor of skidders. In one camp we are operating two high lead sides and we get about 1500 feet for every man on the payroll. At the other camp where there is a skidder and a high lead operation we get about 1400 feet. Ordinarily with skidders we run from 1500 feet to 2600 feet, and we average about 130 to 135 logs a day scaling from six to seven hundred feet each. This average includes time required for moving the different skidders.

President Stewart: What stand per acre are you logging in?

Mr. Newbegin: It will run probably from 30,000 to 35,000.

F. R. Olin: We purchased a steel spar skidder a short time ago, and I was asked to prepare a statement regarding its operation. We, like many operators, were rather skeptical as to the practicability of overhead skidding, and for a long time we kept away from it. Finally, like many others, we started to dabble in it in a small way to see whether we could find something that was suitable to our conditions.

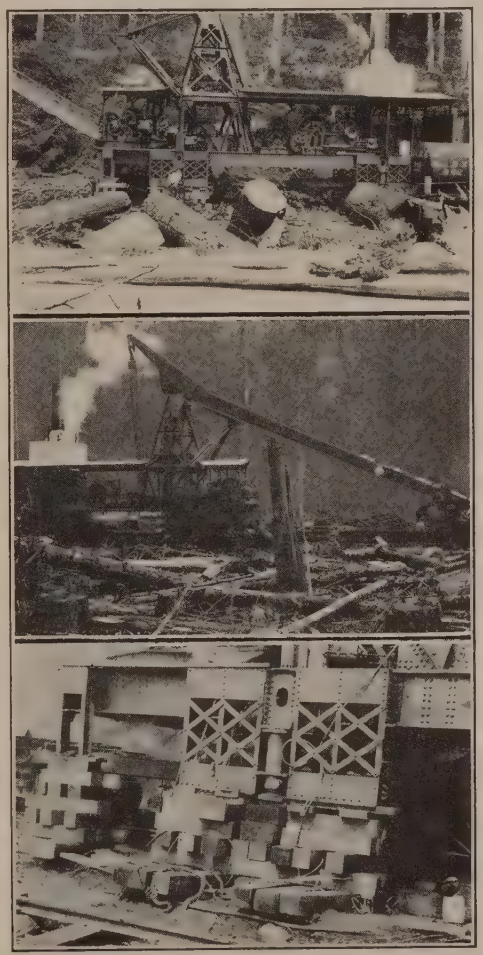
We first tried what you may call a home-made overhead, and while we worked it for quite a while, we found that there were many points about our machine that were not quite right. Still, we were learning. Finally, we tried another rig which was more improved than our first one and which did better work. After operating this machine for some time we felt that we wanted to make a further investigation as to just what kind of a machine, if any, we were to put in. We, therefore, made several trips around the ocuntry looking at different types of machines, and in the fall of 1922 we made up our minds to purchase what is known as a tree rig skidder.

### *Skidder Proves Satisfactory*

The particular timber in which we started this machine is on very rough and steep ground. The timber averages about 600 feet to the log, but on some settings it runs even smaller. We put this skidder to work in the spring of 1923, and we were very much gratified with the results we obtained. In fact, it was our intention to install another one just like it, but we thought before making any final decision we would go around and look at some of the new steel tower machines, which we understood were operating successfully in other camps. After a thorough investigation, in the fall of 1923 we decided to put in a Lidgerwood steel tower machine instead of another tree rig, believing that we could reduce our cost by the extra investment which was necessary for this type of machine.

We have now at our operation at Mill City two Lidgerwood skidders, one of the tree rig type and one steel tower type, so that we are somewhat in a position to know what the advantages and disadvantages of these mechines are, as applied to our operation. While the tree rig machine has given excellent service, we have found that the tower machine has many advantages that are not found in the tree rig machine. We find that we can reach out just as far with a tower machine as we can with a tree rig. This is due, possibly, to the fact that we have, I believe, the first 100-foot steel spar machine that was ever built. This is the point where we were rather skeptical of the tower machine before purchasing. The machines that we saw all had 75 and 80-foot towers, and we insisted that we should have a 100-foot. This high tower has worked wonders when it comes to going out long distances, as it not only makes logs easier to get and land and gives your loaders a better chance to do their work, but it gives you a perfect lead on your lines. Further, we found the 100-foot tower machine easy to handle while moving. The spar itself is an ingenious affair. Not only do the guy lines pass through the spar out of the way of all the rest of the rigging, but in addition to being able to raise and lower it when moving, the spar is so arranged in a universal trunion that it may be tilted from side to side in order to get the proper leads, and at the same time take practically all the strain off the steel work of the tower and upper frame. This, in itself, goes a long way towards making a success of the machine.

*Lidgerwood steel spar skidder with 100-foot spar at the camp of the Silver Falls Timber Co., Silverton, Ore.*



*Top—Skidder No. 1 of the Silver Falls Timber Co., which handled a total of over four and a half million feet during May. Center—Showing how the skidder is moved. The boom is lowered upon a flat car, and the total weight of the machine is divided over 24 wheels. Lower—One of the hydraulic jack legs upon which the weight of the machine rests during operation. A skidder can be moved and set up for operation in one day.*

### *Description of the Machine*

We have before us a pen sketch of a tower machine very similar to the one which we have. You will note that there are three engines on the lower platform, and one at the top of the tower. The rear engine with the boiler is the skidding engine, having 12x12 cylinders for 200 pounds working pressure, and five drums on our machine. This engine is built almost entirely of steel, and is strong enough to handle anything we have in the woods. In fact, we haven't been stuck yet, and just recently we cut down the steam to 175 pounds. This engine is equipped with the interlocking and slack pulling features. The interlocking does away with the use of the brakes for holding back the load. In other words, the drums, when the frictions are set, are tied together, with one rope paying out as the other comes in. The slack puller is operated by a separate drum on the front of the skidding engine. The skidding engine is also provided with a drum to raise and lower the steel spar and a transfer line drum.

Next to the skidding engine we have a four-drum, 10x10 utility engine, each shaft of which carries two drums. This engine serves the purpose of spotting the cars, handles the straw-line, and its two front drums handle the heel blocks which raise and lower the main cable. No regular engineer is employed to operate this particular engine. It is handled by the riggers, when in use. In front of the machine we have a 12x12, three-drum loading engine mounted on a turntable. The front drum of this engine handles the log, and the two rear drums handle the swinging of the boom. I want to call particular attention to the swinging of this boom. It is a simple and efficient way of handling a boom of this kind, and when it comes to a log loader, I believe it is superior to anything that I have seen anywhere. It is not a question of loading logs with a machine of this kind, because I believe a loader of this kind would, with an experienced man, load two or three times as much as you could yard. The loading engine is very powerful and will handle on a single line any log that we have. I understand some of the users have loaded logs up to 8000 and 9000 feet, and these are pretty good-sized logs. The great advantage of this loader is that it swings from the end of the boom, rather than from a swinging mechanism on the turntable. In other words, the longer you boom the easier it swings.

Up in the tower we have another engine, I believe a 3x4. This engine is connected up with four drums; each drum has attached to it one of the guys. These guys, as I have said before, pass up through the spar, out over the sheaves in the top of the spar, and are fastened to suitable stumps around the machine. This is a pretty handy rig and serves two purposes, automatically handling the guys and serves to tilt the tower to give perfect leads.

### *Hydraulic Jack Legs Support Load*

The main platform of the machine straddles the track, the empty cars passing under it. Six or eight steel legs are attached to the platform on which the machine sets. Four of these legs are equipped with hydraulic jacks, operated from an independent steam pump and when moving the rig the moving car is shoved under the machine; the jacks raise it off the blocking and lower it on the moving car, and the tower is let down on a car ahead of the machine. Then it is ready to move to the next setting. The method of moving a machine of this kind has cut down the time lost with other types of machines in moving from one setting to another. In fact, you can move it in about one-third of the time that it formerly took with the tree rig machines, unless you spend the time and money necessary to rig a tree ahead. This, in itself, means a great saving, not only when you consider the time saved in moving, but as all of the head rigging is permanently fastened to the spar, it is not necessary to rig up again at the new setting.

With this general description of the machine in mind, I will try to explain its advantages in relation to logging costs and output, which naturally are the items in which we are most interested in our logging. In the first place, the railroad may be run and the setting picked without any thought of reaching standing spar trees, or the necessity of raising trees where there are none that can be reached. Thus, one need only consider the natural contour of the section to be logged, and set at the points to which the timber will come out easiest, logging the ground in the natural way. Considering the fact that the machine can be moved from set-

ting to setting and rigged up ready to log in eight hours, that there are no expensive settings to dig, and no elaborate landings to build, you can readily see that it is practical to move as often as the lay of the ground may require, making it unnecessary to log perhaps a quarter of a section over a ridge so high that it is hard to get the skyline high enough to log to advantage.

With a tree rig skidder it is different. It is necessary to either find a spar tree standing or raise one, neither of which can always be done just where we would like to set. Then there is often a setting to be dug and spur to put in. With the setting dug, it is a three-days' job to move, rig the tree and get ready to log. With all this expense attached to moving, the natural tendency is to reach as much timber from each tree as possible with long skylines, and over ground which does not lay right, resulting in reduced output and higher logging costs.

### *Tower Machine Gives Biggest Output*

The tower machine will average considerably more in output, due largely to the fact that it can be operated over shorter spans and with the contours of the ground to its advantage. Another advantage which should not be overlooked, and that is by no means a small one, is that of the loading rig. The swinging boom loader, using one tong line and heeling one end of the log against the boom is without doubt the fastest loading system being used in the woods, loading logs from any point around the machine where they may be dropped. Its capacity is far greater than the maximum capacity of the skidder, so that the logs may be loaded as fast as it is possible to skid them and the landing kept clean. The loading crew consists of the head loader and one second loader, as against two second loaders on some and three on other types of machines. The average crew for the machine is about 18 to 21 men, depending on the number of chokermen and riggers used.

These advantages of the steel spar machine make it, we believe, best adapted to our conditions. In country where very long spans are necessary the tree rig may have some advantages, due to smaller first cost, and on account of the longer spans the moves are cut down. The output under these conditions will be smaller so that the loading can be taken care of satisfactorily by a single tong rig or duplex loader. But for general all-around conditions of logging we believe the steel spar is the more complete and universally adapted to logging.

President Stewart: How much cheaper do you feel that you log with the steel spar rig than you did with donkeys?

Mr. Olin: From 75 cents to $1 a thousand cheaper.

J. J. Donovan: What does the skidder cost?

Mr. Olin: Approximately $50,000.

A Member: How far do you reach out?

Mr. Olin: We have reached out 1500 feet successfully.

A Member: How many thousand feet would you skid in eight hours on logs that would go 500 feet to the log?

Mr. Olin: We are logging between 60,000 and 70,000 feet in the very roughest ground we have. There is a great deal of defective timber and rough canyons, very small logs, and we are taking the smallest chunks.

A Member: What kind of fuel do you use?

Mr. Olin: Oil.

Mr. Vinnedge: From the time you haul the last log on one setting until you are rigged up at another, what is the average time for moving the steel tower machine?

Mr. Olin: We clean up, move and start loading at another setting in one day.

President Stewart: Coe Wheeler, can you tell us how much cheaper or how much better you log with skidders than you used to with donkeys?

### *Declares Skidder Costs Less*

C. H. Wheeler: I think we can log a $1.50 a thousand cheaper with skidders. Our cost figures show $1 cheaper, but there are things that don't show up in the cost sheets. For instance, in high lead logging you have a lot more railroad. With skidders, too, we have cheaper men, less experienced men. Also the head rigging is very light. We use inch chokers.

President Stewart: Have you ever checked your labor cost per thousand with the skidder as against your labor cost per thousand with high leads?

Mr. Wheeler: Yes. We started out with the present show in 1915. We had one donkey side, and in 1916 we had a Lidgerwood side. From that day to the present time we have logged cheaper with the skidder than we have with the donkey. Last year we added two more tree rig skidders and we displaced one of our donkey sides. We were logging three sides with skidders, and we laid off our donkey side because it was cheaper to log with skidders. Up to last year we had a hard time to find settings for the skidders, and after that we had a hard time to find settings for the donkeys. We haven't used donkeys since June, 1923, except to cold deck on a ridge.

President Stewart: You started in with the steel spar skidder and with the tree rig?

Mr. Wheeler: Yes.

President Stewart: Which do you prefer?

Mr. Wheeler The steel spar. The steel spar is cheaper. Just as Mr. Olin has said, it is cheaper to move. You might be able to move a tree rig as quickly, provided you had it rigged up ahead. But you have got to have a rigging crew, and that is expensive.

President Stewart: I am wondering if your country is better adapted to skidders than the general fir country?

Mr. Wheeler: We have some smooth ground and we have some rough ground, but we find on smooth ground we can still log cheaper where we are using skidders.

### *A Difference of Opinion*

President Stewart: I don't believe the Crossett-Western Company at Knappa has the skidder business worked out very well. We have had one working a year and a half, a tree rig. For the total input so far this year our labor cost per thousand with the skidder has been at least 25 cents per thousand more than it has with any of our other sides, all of which are high leads and skyline.

Mr. Erwin: Don't you think that is partly true because you had a yarder operating on the end of this skidder part of the time? Another thing, you have been logging small timber with your skidder where you have been hauling immensely large fir with your donkey engines. I think you had a much better show with your donkey engines than you had with your skidders.

President Stewart: The average size logs we put in with the skidder has not varied greatly from the average size logs with the high leads, on account of the fact that we get far more hemlock with the big yellow fir; so the average per log does not vary greatly. But I can't say that our experience with the skidder so far, that is the tree rig, has been especially pleasing. We are not sorry that we got it, but I haven't been able to see any particular profit in using it in our country.

Mr. Donovan: Mr. Wheeler, I would like to know what is approximately the distance that you brought your logs by high lead as against the average general distance that you brought them with the steel spar, and the average as near as you can tell of the size of the logs?

Mr. Wheeler: With the high lead we brought our logs on the average of about 700 or 800 feet, and with the steel spar skidder we bring them from 1200 to 1800 feet. The logs average 1500 feet.

Mr. Moore: What length of logs is the maximum that could be handled by the skidder, and compare it with the efficiency of handling the 40-foot logs which I understand they cut?

Mr. Wheeler: In our operation during the war we logged ship timbers up to 84 feet long. We loaded them out with the steel spar skidder which we have now and we were able to load every log that we got. However, I will say this: When a long log comes in, you have got to have a landing suitable to land the log, otherwise there is no advantage whatsoever. It has a great advantage over a swinging boom, because you have only one tong to handle when the log lays crossways, and you can load it with less trouble because it is easier to set the tong. So we were able to load as many with long logs as with short logs.

Mr. Erwin: If you were not shipping your logs over a main line railroad, and if you operated your own road and used trucks, would you cut logs longer than 40 feet?

Mr. Wheeler: I think we would stick to 40-foot logs. Think you can handle them nicer, and get better results in falling and bucking.

### *Can Move in Two Hours*

J. H. Meister: We have been using Lidgerwood skidders for a long time, operating in pine, and we find them to be very efficient. We handle all 32-foot logs if we can. We don't figure on cutting anything longer or shorter, if we can help it, for the reason that is what they want at the mill. But I don't see any reason why you could not cut them as long as you wanted to, provided you had a machine big enough to load them. That would be just a case, I would say, of taking it up with the constructors. I never used a tree rig; I don't know much about them. I have seen one or two, and they don't appeal to me. With the steel spar you have your whole outfit with you all the time, and it takes only a short time to move, get your lines up and get going. We find that about two hours is all the time required for moving from one setting onto another.

President Stewart: What is the trouble with these people who require eight hours to move?

Mr. Meister: Maybe they are moving them into another county. From two to three hours with a crew that is used to the machine, from the time they stop skidding until they start again is all we require for moving. They will ordinarily do it in two hours. Of course, if they are not accustomed to the work it will take longer.

President Stewart: Have you logged in rough country?

Mr. Meister: The contour of the ground is not very important. The amount of timber on the ground is what cuts the figure; not the lay of the ground; because any one of you know that between the spar and the tail tree it does not make much difference what the contour of the ground is to a Lidgerwood skidder, for the reason that it picks the end of the log up and carries it clear.

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President Stewart: Our next subject is "Combination Skyline and Incline," by Blaine H. McGillicuddy.

# Combination Skyline and Incline

B. H. McGILLICUDDY: The incline skyline was named by President Stewart. It is to handle cases where you have heavy timber down on a long run out point, say a point three-quarters of a mile or 4000 feet away, and you can't get the timber up to the railroad, and you can't get the railroad down to it. A skyline has to be a pretty heavy rig to reach down and get fir logs that run from four to eight feet on the stump. Logs will dig some heavy holes after you have hauled out some three or four tail spars. That was the case in the Mason County Logging Co.'s operation. Had a lot of Douglas fir mixed with hemlock which extended way out on isolated points which we could not get the railroad up under or out on top to do any good, some of the trees as high as 30,000 feet—great big fellows mixed with hemlock. You know from your experience with the skyline that you can't do much with those big logs; you just fight them all day long, probably pull out the top of your spar tree, pull the high lead block down, your skyline jack or whatnot. So a plan was proposed to drop a railroad incline to the bottom of these long run out points and to reach the rest of the timber with the skyline and high lead on the tail tree. So we dropped the railroad down the point at whatever grade the point carried. The grade ran perhaps 15 per cent for 200 feet and 20 per cent for the next 500 feet. We followed the surface of the ground, kept curves down as much as possible. Now the grade from the top, experience has taught us, should not be adverse less than 3 per cent. The main line will take its natural course around the point to reach all the timber it can; then we keep the main line end down adverse grade minus 3 per cent, then come back on your line, say your ten cars of clearance, and drop your incline down on the point. Your incline comes off 3 per cent and goes down to whatever it gradually comes to. At the bottom you have to put in a short siding with a clearance of about two cars, so when the empty comes down the hill it will go right on into the spar tree, pick up the load, pull it out and set it in the clear, drop the empty in and the loader starts in loading with very little time lost. The car is back for the loader really in the time the loaders are switching themselves on the ordinary system. They cut off the cable from the empty and hook onto the load, which goes to the top and drops in on the main line naturally by gravity. The locomotive picks them up from the top. The crew consists of whatever crew you have on the ordinary skyline, so far as the donkey is concerned. If you use oil, it is just the engineer and possibly you will have a fireman and two brakemen. I think if the incline is short one brakeman could handle it. At that it cuts out one man over the skyline.

I am not going into detail or into comparison of figures on this double skyline proposition and this big double unit machine that is coming out. I am taking just what the ordinary logger has and tries to use. He tries to get by with what

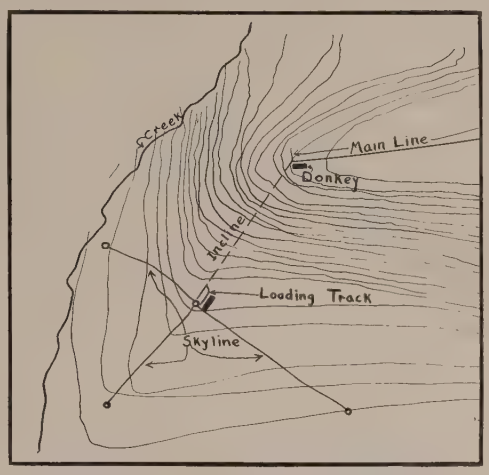
he has and make a little money, without buying a lot of new equipment.

The donkey in this operation consists of an 11x13 McFarlane skidder; the machine is 11 years old; and they are using the skyline drum to lower the cars with. It takes about five minutes to haul the car up, and nothing flat to go down. It takes all around about half an hour to perform the operation, but invariably they get down in time to wait for the loaders five or ten minutes to finish their loading. The maximum capacity would be 20 cars, but that is your skyline capacity.

On one incline we have 20 per cent maximum grade, on another 14 per cent. On the 14 per cent we intend to bring two cars over the incline at a time. We are operating now a 20 per cent maximum, and we have succeeded in bringing two cars over that. Fortunately the company has safety straps on all their cars for their main incline, due to the fact we are using the Sessoms patent incline. This works fine on these inclines in the operation. A maximum of 20 per cent is the steepest we have operated, but from practical experience it solves the problem. Those big logs would have dug an awful hole up that sidehill getting into that main line.

Mr. Meister: Do you use a lowering car?

Mr. McGillicuddy: No; we splice a strap near the end of the main line so a safety strap can be threaded around the car sill for safety, so in case the coupling breaks you have some chance to catch the car. In the Malone operations of the Mason County Logging Co. they are using an old 12x12 wide face Seattle. They bolted up an eight-inch hand ratchet brake on the inside of the engineer's side of the drum; the entire lowering is handled with the hand brakes. You can use compression, but I don't think compression is a good idea because once in a while cylinders blow up.




*McGillicuddy Combination Incline and Skyline*

Mr. Meister: How far can you reach up from that track on each side?

Mr. McGillicuddy: Any distance you can go with the high lead. You can use any rigging off the incline.

Mr. Meister: Why can't you put the skyline down at the end of that track?

Mr. McGillicuddy: That is what is being done. We have a short skyline operating off the lower end of the incline.

Mr. Meister: It seems to me that a Lidgerwood would work down in there better than a donkey?

Mr. McGillicuddy: Suppose you had only one landing; probably you had only one situation like that; you would not want to buy a machine for ten million feet?

Mr. Meister: No. Then I would use what you have.

Mr. McGillicuddy: You can do anything with modern machinery, but this is a case of using the machinery we have. We will have two or three situations like this, and no more then for the next four or five years probably. It is just a problem that comes up, and Dave Stewart calls it an incline skyline. It takes care of the entire day's output. That is all you want; you want the logs on the car and the car to the main line.

# Causes of Fires in Logging Operations

PRESIDENT STEWART: We have on the program for informal discussion the subject "Causes of Fires in Logging Operations." I am sure it will be interesting to know what the real causes of most of our forest fires are. I am going to call for volunteers to tell us what they find are the real causes of their forest fires in logging operations.

I might say, to start with, in the last five years I don't think we have had any fire that started and got beyond control from a donkey engine stack. Our fires have been caused the last few years by high speed, and perhaps too small head trip blocks, and things of that kind; the haulback line getting fouled in the trip block and causing so much friction it sets fire back clear to the tail tree, which is almost impossible to fight.

Mr. MacGregor: I think about 75 per cent of the fires in Idaho are caused from cigarettes, not from machinery.

President Stewart: Do you allow cigarette smoking in your camps in the summer?

Mr. MacGregor: We try not to allow it, but we have to have a man to watch every man, and then have a man to watch him to keep them from smoking cigarettes.

President Stewart: Do you have tailor-made cigarettes in your camp?

Mr. MacGregor: Tailor-made principally.

L. T. Kniskern: The only fires we have had this year have been caused by dynamite. That has been our fire source for several years. In every case it has been caused by powder of some kind.

President Stewart: I wonder how many know of the small pocket battery which you can get and which it is perfectly practicable for a choker hole digger or powder monkey to carry in his pocket to use instead of matches and fuse for shooting choker holes. That practice was in use on the Columbia River this summer and it proved a very good scheme.

Geo. M. Aitken: I think that a great many fires are due to the strike-anywhere match. I think it would be a good idea to have a safety match.

Mr. Erwin: I think it is possible to control the fires from donkey engines. I think there are few fires nowadays in any camp that is at all careful that have really started and have gotten away from the donkey engine. I have observed that most of the powder fires caused are caused from threading the fuse through the powder instead of putting it into the end. All makers of powder send out instructions telling how properly to put the cap and fuse in the stick. They advise sticking it in the end of the stick; but a great many loggers thread the fuse through the stick with the feeling that sometimes the cap pulls out of the stick in tamping the hole. It seems to me when the fire goes through the fuse where it is threaded through the stick it sets the powder afire, then when the fire gets down to the cap and explodes and throws this burning powder around the wood, I think that is what sets the fires from the powder. Probably the battery would eliminate that.

I think the fires I have had experience with lately are nearly all due to the pot shots. We don't have much trouble any more. One reason is that we burn oil. Oil, however, does not entirely eliminate the fire hazard. There seems to be a lot of little pieces of burning soot, and stuff like that, which we have to watch. For instance, we were moving a donkey in a layout one day and a fire started but we put it out immediately. Oil does not entirely eliminate the fire hazard—almost, but not quite.

A Member: In British Columbia this summer I met a ranger who told me of two fires caused by one log sliding over another. He saw one fire start. Both fires started on the same logging operation. It was very steep country. A tree sliding over a dead cedar in each case caused the fire. One of the fires was put out easily, but the other one was hard to control.

President Stewart: I believe a fire was started in the same way in the Elwood camp of the Kerry Timber Co., down the Columbia River, two or three years ago.

Mr. Donovan: We had two fires this summer. One was started by an oil-burning donkey, and it was put out in about ten minutes. The fire started 50 feet away from the engine stack and it was put out in about ten minutes with one of these Sedro-Woolley fire-fighting machines which we have on hand ready for action in two of our camps and which are very effective. As a result of that fire occurring from our oil-burning donkeys and locomotives, next summer every one of our donkey and locomotive stacks where we are burning oil will be screened with a coarse screen, probably half an inch mesh. My observation is those fires occur through soot, usually in flakes the size of a silver dollar, coming out the stack when the engine is working hard. Where you have a dry day and perhaps cedar bark, and this flake of soot drops just right, you will have a fire, and you will have it very quickly. Of course the matter of the size of the screen is very experimental. I think a coarse screen like that will probably require cleaning once a day, perhaps twice, but that it will be effective. I don't believe we will have any fires after they are screened. That fire was put out without any interruption of the work, or any damage, other than about 20 minutes.

The other fire in the Snoqualmie district was undoubtedly caused by a cigarette from one of

## THE POLSON LOGGING OPERATIONS IN 1889

*Here is an authentic photograph showing the complete logging equipment and motive power of the Polson Logging Co., of Hoquiam, Wash., as it appeared in 1889. As will be noted it consisted of a few jack screws and six yoke of oxen. This photograph even antedates the affiliation of Robert Polson in the joint enterprise and the equipment shown was then the sole property of Alex Polson, who was later joined by his brother. The scene was taken on the Hoquim River. The present company, an eight-side operation, operates fifty miles of railroad, with six direct connected locomotives, and produces an average of seven hundred thousand feet of logs per day.*

the fallers or buckers walking into camp for lunch. He threw a cigarette down, it was a very dry day, on the 6th of August, near a bridge, and in a very short time the whole valley was aflame—the most disastrous fire in the woods we have ever had. It burned three and a half million feet of logs up completely, about a dozen bridges were badly damaged, two cars burned up and four donkey engines burned over. The donkey engines were repaired for $1500 or $2000 apiece, perhaps. But that was caused undoubtedly by the carelessness of a faller or bucker. I think the gentleman who said 75 per cent of the fires are caused by cigarettes is correct.

## Thursday Morning

AT the request of President D. E. Stewart, Mr. Jensen read a letter from Alex Polson, of the Polson Logging Co., Hoquiam, Wash., regretting his inability to attend the Congress. Mr. Polson made a plea for the elimination of the irresponsible wholesaler and commission man and urged the mills to exercise a closer supervision over their sales. The result of such an action, according to Mr. Polson, would be the stabilization of the market to the benefit of both manufacturer and consumer. The keen competition which results from market instability works a hardship on labor, which is first to feel the effects of depression in the industry.

President Stewart: Mr. Dunham will give us a few words on his new skyline.

(Slides illustrating the Dunham system were thrown on the screen and explained as follows):

# Dunham Skyline

FORREST T. DUNHAM: This system was originated at the National Lumber & Manufacturing Co. at Balch, Wash. It came about because we didn't have a skyline and were using a plain Washington two-speed 12x14 yarder. The main line cable and the skyline cable is all one line in this system. We have no standing line. The donkey has two drums, the haulback and the main line, and the main line is the skyline—pick up, haul in, and everything on the one line.

The carriage, built by the Washington Iron Works, has an 18-inch sheave in the top with a roller bearing, a 14-inch sheave in the bottom, and the fall block fits in the bell-shaped receptacle at the bottom. There is only one sheave in the carriage that turns when the line is going out or coming in.

That is the fall block, which weighs about 835 pounds. We use seven-eighths and one-inch chokers, and one and one-eighth-inch main line. One and one-eighth-inch main line is the biggest line we use.

The load can be picked up off the ground and carried straight in the air, or if so big a skyline won't carry it the deflection is automatically taken care of so you can't overload it. One end will drag when it is too heavy, but when we are hauling cedar we generally step on the haulback brake and hold it up.

### *Only Top Sheave Moves on Cable*

There is a load with 6000 feet that has just been picked up off of the ground. The fall block is down in the carriage. The only time the sheave in the fall block turns is when the load is being picked up or being lowered; otherwise the carriage and the main line travel at the same speed and the sheave in the bottom part does not run. The top sheave is the only one that moves on the cable.

President Stewart: Did you say that was not a skyline, Mr. Dunham?

Mr. Dunham: It is not strictly a skyline. When you slack the main line it all comes down.

President Stewart: Have you an outer end fastened to a tail tree?

Mr. Dunham: No. The main line goes from the main drum over the high lead block to the carriage through the fall block and through a fall block on the back spar, back through the main carriage, through a block on the main spar tree and made fast to the carriage. It takes three times as much line for the main line as the distance you are hauling. The log travels at main line speed.

President Stewart: How far do you haul?

Mr. Dunham: We have it stretched a thousand feet now. We figure on going 2000 feet. Our railroad is on high ground on a ridge all the way, and we plan to take the logs out of the canyon with that machine. One thing about it, the logs won't hang up; the front end of the log is always off the ground, and if it is a light load you can carry it straight through; if it is a heavy log you don't need to carry it, you can let one end drag, but the front end is always up.

A. Meserve: I would like to ask Mr. Dunham if he has any special brake?

### *Regular Engine Brakes Used*

Mr. Dunham: We have the regular brakes on the 12x14 two-speed Washington engine.

Mr. Meserve: What is the extreme distance you can go?

Mr. Dunham: As far as we have to, across the canyons, 2000 feet or 2500 feet.

Mr. Meserve: Do you pull in the logs with the main line, and the main line also forms the skyline?

Mr. Dunham: Yes.

Mr. Meserve: Then you haul back to the woods the same as you do with a high lead or skidder?

Mr. Dunham: Yes.

E. R. McCory: We operate in pine and I would like to ask how you regulate the tension on a line with a heavy load?

Mr. Dunham: The tension on the line is automatically regulated by the load. You pull hard enough to clear your load; whenever your load clears it starts towards the engine. The deflection is automatically taken care of by the load you put on it. The only limit to the strain you put on your line is whatever the donkey will pull. If you have an engine that will pull enough to break the line you could break the line if you put on load enough. Ordinarily we use an inch and three-eighths line on a 12x14. We use 200 pounds of steam with high lead yarding, and with this machine we are going to use 150 pounds pressure and one and one-eighth-inch line, and whenever we reach the maximum capacity of the engine we are stuck the same as we are if we are yarding with a high lead. When we used this rig the first time the engineer said, "You might as well have a governor on that engine and have a man to put on the frictions, because it does not pull any harder when the log starts than it does to pick up the slack of the line." We yarded a load with 7000 feet in it with a one and one-eighth-inch choker, with this Washington two-speed in high gear and the throttle open only about a quarter of the way.

President Stewart: What stand of timber average per acre?

Mr. Dunham: About 50,000.

President Stewart: What is your largest log?

Mr. Dunham: We yarded one log that had 5000 feet in it.

President Stewart: What would you average per day with that rig?

Mr. Dunham: We have never yarded straight through. We have been closed down this summer, and we worked this thing out to use when we start up. We have yarded probably ten or fifteen carloads.

B. H. McGillicuddy: How do you hold your carriage when you land the logs?

Mr. Dunham: When the load drops at the spar tree the carriage sets up and the fall block comes down. When the carriage settles it always settles towards the spar tree.

Mr. McGillicuddy: Then the tail hold on the carriage will hold the carriage to the tree?

Mr. Dunham: Yes. We have but one man unhooking, and he always had plenty of slack.

Mr. McGillicuddy: When the carriage goes to the woods do they set the haulback tail hold away and yard as a slack line?

Mr. Dunham: Yes; just use the haulback. We have pulled it out 150 feet from the skyline to one side.

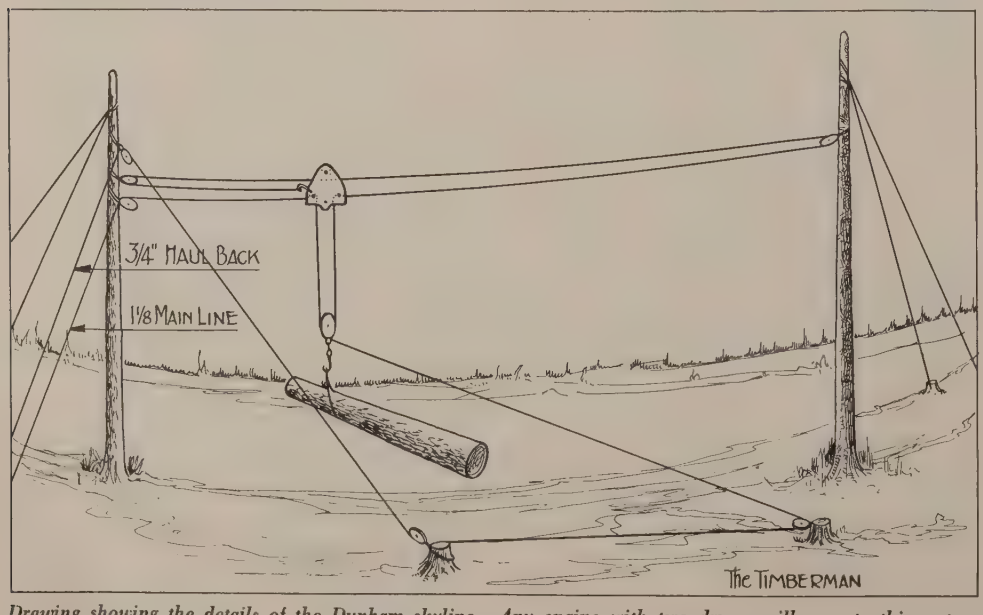
Mr. McGillicuddy: Does it pull much harder on the haulback and do you use a heavier haulback line?

### *Loads Are Pulled Easily*

Mr. Dunham: It does not pull as hard on the haulback as it does to take back a big carriage. With this rig we were yarding across the canyon and we used a tail block on a stump instead of on a spar tree, which gave us plenty of deflection in the canyon.

President Stewart: Does your experience with it so far make you think it is superior to ordinary skyline work?

Mr. Dunham: It is much cheaper, and we use small lines. A 10x12 engine is plenty big enough to operate it. We use a small choker, seven-eighths and one inch, where we use one and a half inch with the high lead. We figure on taking three men off our rigging crew while we are yarding with this system.




*Drawing showing the details of the Dunham skyline. Any engine with two drums will operate this system. An inch and one-eighth main line is declared ample for this rig, so that any engine that develops power within these limits will be able to operate it. This means that a 9x10 or 10x12 machine will be large enough to do the work of a 12x12 or 14x14 engine with ordinary high lead rigging.*

Mr. Vinnedge: I have taken the liberty of drafting one resolution and have submitted it to two of the members of the committee and ask for it to be acted upon:

## Resolution

"Whereas, The 15th session of the Pacific Logging Congress in session at Portland this morning learned with sincere regret of the absence of George M. Cornwall, necessitated by the orders of his physician; and,

"Whereas, The membership of the Congress is deeply sensible of the obligation we owe Mr. Cornwall for his genius and constructive ability in forming and maintaining the Pacific Logging Congress through the past years; therefore, be it

"Resolved, That this resolution bespeaking the love and respect this Congress bears him, be wired to him at his home in Berkeley to assure him of our earnest hope that the 'donkey doctor' engaged by him to make over that splendid machine may soon and successfully return it to the job to run with usual speed and efficiency."

I would like to ask for the passage of that resolution.

(Moved, seconded and adopted unanimously.)

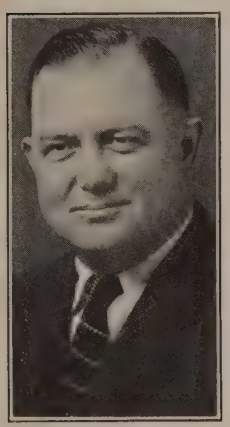
President Stewart: We will now hear from W. A. Erwin, of the Crown-Willamette Paper Co., who is doing something new in logging.

(Moving pictures were shown of the re-logging for small pulp timber by the Crown-Willamette Paper Co.)

# Salvaging Pulp Wood from "Slash," or Re-Logging

**By W. A. Erwin**

IN that region west of the Cascades extending from British Columbia to California there is a vast amount of small pulp timber growing amongst the more mature stands of fir, cedar, spruce and hemlock. Since logging began in this district it has been customary to log out the larger trees, leaving the smaller timber, as it has not been considered profitable to log it. The method of logging has been such that a great part of the small timber has been knocked down or has been blown down and has been left on the ground; in this condition it is called "slash." It is estimated that there is enough pulp wood in this slash to supply, to a large extent, the amount of pulp wood required by the paper manufacturing plants on the Pacific Coast. To salvage a part of this pulp wood and to better prepare the ground for growing a new crop of timber, by decreasing the fire hazard, is the reason for re-logging. The possibilities in re-logging have such a great bearing upon the future of timber and logging industries, and particularly those timber tracts in which there is a large proportion of pulp timber, that I feel that my ability is inadequate to discuss the subject with the intelligence it merits. If I had the keen mind and the marvelous vocabulary of R. W. Vinnedge, the quaint philosophy of George M. Cornwall, the wit and humor of J. J. Donovan and the practical viewpoint of Tom Murray I might approach the subject. I shall, therefore, confine myself to giving you a brief outline of what our problem is and what we have done, and hope that you will enter into a free discussion about it in order that we may better learn how to do the job.



W. A. ERWIN

### *How Re-Logging Originated*

RE-LOGGING is a product of the Pacific Logging Congress. To D. E. Stewart must go the credit for being the first man, at least in this district, to see the enormous waste in the slash being made in nearly all camps and to venture the opinion that a part of it might be salvaged at a reasonable cost. That was four years ago, and since that time it has been discussed informally behind the scenes of the various sessions of the Congress and a great many members who are here today have offered many valuable suggestions. It has been our company's privilege to take these suggestions and make a beginning, humble and crude though it may be.

In looking at the problem, three possible ways presented themselves. One was to take out the pulp material in the form of cordwood with tractors or horses; another was to take it out in the form of cordwood using an overhead sky line rig of some kind. The third method was to use an interlocking skidder and take it out in the shape of logs. This latter method was decided upon. We had some 40-foot connected logging trucks we had used in another of our operations. These were converted into cars with four bunks and each bunk had two iron stakes 40 inches high. We got this idea from J. H. Meister, of the Shevlin-Hixon Company, and it has worked out very well indeed.

With our re-logging skidder we have been going out 2000 feet, using inch and a quarter sky line, seven-eighths skidding line and five-eighths haulback line. For chokers we use five-eighths line with eye splice in each end and Peters hooks and slides. Oil is used for fuel and 17 men make up the crew.

On ground that had been logged fairly clean with donkeys, that is, as clean as most camps log, we have managed to log 500,000 feet in a month and learned that we were getting about 10,000 feet per acre. In figuring costs we have charged nothing for building railroads or for stumpage and find that the cost of putting this material in the raft compares very favorably with the cost of logging the original stand.

## Discussion

R. W. Vinnedge: Mr. President, I think this is one of the most instructive papers presented at this Congress for a good many years. Certainly one of the problems of this industry is a closer utilization of our raw material, and we are constantly being prodded by the government to bring about that utilization. I am familiar with a survey that was made in Grays Harbor County about four years ago at the instance of the Department of Commerce, to determine what was left on the ground after ordinary logging operation, and the figures were astounding. As I remember them now, it was to the effect that 70 million feet of timber that could be converted into pulp was left on the ground in one year. Figuring over a period of six or seven years, it would amount to a half billion feet. That is what we are coming to in the future. It seems to be a little bit in the future at the present time, because the realization price will not permit us to do it in the average operation. The timber left on the ground in this operation is much more than on our operation, and of course we haven't the means of converting it into dollars that the Crown-Willamette has, but when stumpage gets to $11 a thousand, as it is in the South, we will be doing this same thing. See if that is not an accurate prophecy.

### *Purpose of Re-Logging Explained*

There is just one statement in that foreword I would like to ask about. It stated that the purpose of re-logging was to remove the debris from the ground to permit of quicker reforestation. Is that the prime cause? I am asking perhaps an impertinent question, but I want to get down to the fact as to just how profitable it is, or how much you are losing on it?

Mr. Erwin: Our original timber stand runs about 40,000 feet to the acre; that is the cruise on which we bought, and that has checked out in the way we have been logging with donkeys. Our donkey engines get out about 40,000 feet to the acre. If we can log 10,000 feet more to the acre by this method we have 25 per cent more timber than what we thought we had. That is one advantage. The other advantage is, this makes just as good paper as the larger trees; in fact, a little better. I don't believe there is quite the amount of waste about it. And as to whether we can make any money or not I will say we are putting it in the raft at less than $10.

President Stewart: You are buying hemlock for $10, Bill; where does the profit come in this year?

Mr. Erwin: Well, we think hemlock will go up next year.

President Stewart: Mr. Erwin was giving me a little undue credit for this re-logging business. I don't believe I was ever the originator of anything entirely new in logging, and, so far as I know, G. G. Johnson, of the Capilano Timber Co., of Vancouver, B. C., was the first man actually to do re-logging.

In our own particular works we found by actual measurement of sample acres that we had about 13,000 feet per acre of that small unsalable stuff that could not be logged by a big donkey engine. We did a great deal of thinking and some experimenting on the subject of re-logging. However, we were quite disappointed in the price we have been able to get in the ten years for our hemlock logs, and we didn't feel justified in going ahead with it.

L. T. Murray: I think this work Mr. Erwin has started is of vast importance to the industry in more ways than one. Ultimately it is going to mean we are going to get 10,000 feet more stuff on every acre of land we have, which is a principle of conservation. The price they are putting those logs in for today is a very reasonable price when you consider the saving, even though you can buy logs at $10. But putting the land in shape for reforestation, and realizing another 10,000 feet per acre, simply means you are going to carry your operations on just that many years longer.

In that operation, Mr. Erwin, how large a log do you handle with that rig?

Mr. Erwin: The largest log we have handled is 2000 feet. The donkeys have left in the woods an occasional log of 2000 feet.

Mr. Murray: Have you found any tendency on the part of the big skidder that goes in ahead to leave more logs than they otherwise would, knowing that this other rig was going to come after them and pick them up?

### *Work to Be Continued*

Mr. Erwin: One of our troubles at Astoria, where we have been logging with donkey engines, is that we have been logging too close, too small stuff. Our scale has been kept down and our cost has been increased, on account of logging timber that has been too small. We will probably buy another re-logging skidder for Astoria and we will probably operate two donkey sides and two re-logging skidders following these sides. By getting a larger average log we should lower our donkey cost, and by leaving more timber on the ground for the re-logging skidder we should get a lower cost for it.

Mr. Murray: So your cost of $10 is not all there is to the story; you have really decreased your cost on first logging?

Mr. Erwin: I think it will work out that way.

President Stewart: Mr. Erwin has been logging at one place with this small skidder. At another camp they have a big skidder doing what we call commercial logging and re-logging at the same time. You will be interested in hearing from him as to which method he thinks is best.

Mr. Erwin: I think it is best to clean it up

*With a crew of seventeen men this pine type steel spar skidder is salvaging a total of five hundred thousand feet of pulpwood per month after the ordinary logging operations are completed, at the Youngs Bay camp of the Crown-Willamette Paper Company, near Astoria, Oregon.*

at one time. There is danger of burning this pulp wood up if we leave it on the ground. It makes better paper if we get it into the paper mill as soon as we can. That was a question that confronted us, as to whether it was cheaper to put in the big skidder and just take out big logs and leave the small stuff for the re-logging skidder, or take all at the same time. After watching the re-logging skidder at Astoria and the big skidder at Cathlamet I have come to the conclusion it is better to take it all out at one time. This decreases our scale to probably 15,000 to 20,000 feet per day, but in the long run I think it pays.

Our system of falling and bucking there is such that anything less than 12 inches we cut into a maximum of 40-foot logs. That is what we call our small stuff. We bring it along in with the big stuff, and we pile it up on the rollway. When we have a load we run in one of these four-bunk cars and load the small stuff on it. We have no trouble at all keeping our small stuff loaded out.

President Stewart: What is the smallest length log you haul?

### *Logging Down to Eight Feet*

Mr. Erwin: Eight feet. We instruct the boys to take down to four inches in diameter and eight feet long. Of course, we leave a few now and then in spite of all of our efforts, but we manage to get most of it anyway.

A. Meserve: Mr. Erwin, if you run into a special show of large stuff wouldn't this small stuff hold up your loaders?

Mr. Erwin: So far we haven't had any trouble. We haven't a good logging show, to begin with; it runs about 35,000 to 40,000 an acre, with no excessively large stuff at all. The biggest hemlock is two and a half feet on the stump.

Mr. Meserve: What is your average production a day?

Mr. Erwin: We are getting 65,000 a day with that skidder, doing both the re-logging and logging the big timber at the same time.

C. H. Wheeler: Mr. Erwin, when you are logging with your big skidder, how do you hook your tongs into the small stuff?

Mr. Erwin: We have a strap to choke four or five of them at a time. Where we have room on the landing we let them pile up and put two crotchlines on with hooks. We put three or four logs on at a time, and wherever we have a big log we hook in the end of these logs with these hooks.

R. W. Vinnedge: I have heard the counter proposition put up, why not log the small timber before you haul your big stuff, just as we do wth cedar poles?

Mr. Erwin: The reason we don't attempt to log the small stuff first is because from observation we learned that a great part of the material left on the ground was broken parts from the larger trees, and we want to get these broken parts; they make as good paper as any as long as they don't have black knots in them. I don't know exactly what percentage of the debris left on the ground is composed of broken tops, probably 20 per cent.

A. S. Herzig: There is another point that can be brought up on this question of the utilization of waste. The less frequently you have to move in respect to an area the less money you will spend in a year in keeping your camps in operation. It seems to me we are going over our country too fast.

Mr. Erwin: That is a good idea.

R. D. Moore: It has been my observation in logging the large timber with the small stuff that the large trees automatically fall the smaller ones. Wouldn't that be a point to be considered in the re-logging business?

Mr. Erwin: That is true.

C. S. Cowan: I have seen an experiment in cutting pulpwood ahead of the big stuff. What happened in this case was that they took advantage of the fact they were running up a creek, and they built a flume. They got out everything from a four-inch top to a 24-inch butt, they cut it into lengths, brought it down to the flume by horses and flumed it down the creek; and in that way they were handling about 300 cords per day, about 700 feet to the cord.

Donald McFadon: Mr. Erwin, what size chokers do you use in logging the big stuff and the small stuff at the same time?

Mr. Erwin: We have two or three different sizes. On the big skidder at Cathlamet we use five-eighths, three-quarters and seven-eighths. We keep the whole bunch hanging on there and let them take the choker to suit the size of the log.

### *Low Cost Is Surprise*

The thing that surprised me in doing this re-logging work is the fact that we were able to do it so cheaply. I thought the cost would be prohibitive. In falling and bucking we all know an immense amount of it is tipped over. These trees have to be sawed off and limbed. We have our fallers and buckers on the re-logging skidder working by the piece system. We pay them 13 cents per log for cutting into 40-foot lengths. Of course the tops will come out whatever length is left. We found in our first setting that it cost $1.47 a thousand to limb and buck and trim this stuff, which was not excessive.

L. T. Murray: We have a side in our operation today that consists of rather big timber, and a heavy stand of small trees running from about 12 to 18 inches on the stump, that is too small to log, but it is all knocked over. If we had a proper market for that stuff, and if there was enough of it coming into the market, I am sure there would be small mills that could saw it up. If we went down to six or eight inches in fir and we could log that stuff at a cost in the neighborhood of $10, it seems to me there is a possibility.

Mr. Murray: Would you mind giving us a rough idea of just how that cost is segregated?

Mr. Erwin: In figuring our cost we have not charged anything for railroads; the railroad has already been built and has been charged off to the amount of timber taken out with the donkey engines. I think you all will agree with me it would not be fair to charge railroad building expense at this time. We charge railroad maintenance and transportation charge, and rafting and booming charge.

I will have to explain something about the scale we use on small timber. There is no scale rule on the Pacific Coast to take care of logs less than 12 inches. By tests we figured out a scale and then sent a raft of logs through the paper mill and cut it up into cordwood so as to check what we were getting on a cord basis. We made up a scale based on taking the small diameter of the log and figuring it as a cylinder, getting the cubical contents; not the mean diameter, but the small diameter; and taking 50 per cent of the cubical contents of those dimensions. That is the scale we use on small logs.

### *Must Clean Cut in Fir Region*

J. S. Boyce: Mr. MacGregor from Idaho wants to know how we reconcile the fact that getting rid of all this young stuff is the best thing for reforestation when in his part of the country, and in most other parts of North America, they insist on leaving the young trees for a second cut. He probably does not know that west of the summit of the Cascade Mountains in our typical Douglas fir forest the way to get a good second stand is to clean cut and burn, and when the burning goes on this young stuff is killed. Of course he is operating in the pine, where we insist that the young trees must be left. He could not quite reconcile the facts with the discussion.

Mr. Erwin: If our young timber were left standing and growing in a healthy condition there would be no argument; there would be no re-logging problem—it would be a matter of waiting for the timber to mature; but in our method of logging with donkeys the large trees knock down nearly all the small ones. Hemlock does not grow with a deep root; it grows on the top of the ground; and usually the small trees which are left are blown over the first winter. It is a matter of getting it now or never.

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(A quartet from the forest school of the Oregon Agricultural College here entertained the Congress with several songs, which were well received.)

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Chairman Murray: W. H. Gibbons, of the United States Forest Service, will tell us about the work of the Forest Products Laboratory at Madison, Wis., and show us some slides illustrating the character of the studies being undertaken.

# The Forest Products Laboratory

## By W. H. Gibbons, U. S. Forest Service

I HAVE been asked to show a few lantern slides, which I hope will suggest, in a small way at least, the character of work done at the Forest Products Laboratory, Madison, Wis. All of you are familiar with the work of the United States Forest Service in the West. A few may not know that from its establishment the Forest Service has done research work in forest products; that about fourteen years ago this work, which had been carried on in co-operation with several universities throughout the country, was largely centered at the Forest Products Laboratory and in co-operation with the University of Wisconsin. For several years the Laboratory was the only institution of its kind in the world, conducted with the object of turning the searchlight of research upon wood and its uses and making the information thus obtained available to the public.

The aims of the Forest Service in maintaining the Forest Products Laboratory, briefly, are:

1. To conserve American forests by developing the most economical methods of converting standing trees into finished products.

2. To make the growing of timber more profitable through increasing the utilization of both used and unused species.

3. To develop not only new and more efficient processes, but to find ways of utilizing material which would otherwise be wasted; in a word, to find new uses for old materials and new materials for old uses.

4. To render practical assistance to holders of stumpage, loggers, manufacturers, and users of wood and wood products, at the same time to promote forest conservation and the practice of forestry.

Abstract statements of this sort cannot fully picture the Laboratory's activities. The nature and importance of its work will be better appreciated perhaps if a brief survey of the national forestry situation is made. During the past few years the public has come to sense the need of growing more timber and protecting our existing stands and cut-over areas from fire. The last session of Congress, as you all know, passed bills authorizing steps that will go far toward taking care of these necessary measures.

### *Bridging the Timberless Gap*

IT is very gratifying, of course, to note such progress; but fire protection and reforestation alone, important as they are, will not eliminate the threat of timber shortage. If the drain on our forests continues at the present rate (and we cannot cut down consumption without lowering our standards of living), the nation's stand of timber will be wiped out in 40 or 50 years, despite all we may do in the way of reforesting and fire protection. At the end of that time there would be, of course, vast areas of young timber, but it would not be of sawlog size, and we should be facing a timberless gap of many years' duration. The immediate problem, then, is to find means of bridging this gap. How is it to be done? The answer is: To eliminate as far as economically possible the waste in manufacture and use of forest products, thus cutting down the annual drain on the forests and extending the life of our standing timber without reducing the annual consumption. Secretary of Agriculture Wallace undoubtedly had something of this kind in mind when he called a national confeernce on utilization of forest products, to be held in Washington November 19 and 20, and attended by representatives of all the associations and industries financially interested in the manufacture and use of forest products, as well as the representatives of state forest organizations, the trade and general press, and public interest and educational groups.

You loggers know something of the tremendous losses that occur between the standing tree and the final product, for you in your branch of the industry have seen much of this waste. It may be something of a surprise, however, to visualize just what these losses, in total, amount to. For every tree that actually finds its way into manufactured products three are cut. In other words, two-thirds of our timber is not utilized. This may, possibly, seem like an exaggerated statement, but a careful survey of the field seemingly substantiates the figure. The total is, of course, made up of a great many wastes and losses, including timber left in the woods, slabs, edgings, etc., at the mill, careless manufacture and remanufacture, decay, etc. Such conditions not only offer a field of great opportunity for saving, but a chance to get immediate results, in contrast to those obtainable from timber growing, for example. Present wastes and losses are so enormous and the prevailing practice in manufacture and use of forest products is so far below present possible best practice that great savings can be effected right away. By putting into immediate use practices that are now economically feasible a saving of two-ninths of the present drain on the forest will be made. Another two-ninths of the annual forest drain can probably be saved through further research into better practices.

Efficient utilization of wood becomes, then, one of the three necessary steps in our national

forest program—necessary in order to extend the life of our virgin stands to such time as our second-growth material shall be ready for cutting.

It is this phase of branch of forestry with which the Laboratory is concerned. Although an institution of scientific research, it is constantly seeking, in its investigations, practical ways of preventing wood waste. Its activities are naturally diversified, because of the many complicated processes through which wood passes from the time it crashes to earth in the tree to its final use in commerce.

The Laboratory is in charge of a director, an assistant director, and a staff comprised of the heads of the different research and administrative sections. Its personnel at present numbers about 200. During the war the force was expanded to nearly 500. The technical work of the Laboratory is divided among the following sections:

1. Timber Mechanics.—Strength of wood and manufactured articles.

2. Timber Physics.—Experimental and applied kiln drying, physical properties, identification and structure of wood.

3. Wood Preservation.—Wood treatments, glues, and laminated (built-up) construction.

4. Pulp and Paper.—Manufacturing methods and suitability of various woods for pulp, paper, and special products.

5. Derived Products.—Chemical properties and uses of wood and chemical wood products, such as turpentine, alcohol, acetic acid, etc.

6. Industrial Investigations.—Methods and practices in the lumber and other wood-using industries, grades, specifications and mill scale studies.

7. Pathology (in co-operation with the Bureau of Plant Industry.)—Decay of timber, molds, stains in manufactured wood products, and antiseptic properties of wood preservatives.

It is impossible in a brief statement to go into all of these various activities, but the slides may be the means of giving you a fair conception of the work this institution is doing.

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Chairman Murray: The next subject on the program is "Fire Conscious," by Geo. C. Joy.

# Fire Conscious

## By George C. Joy, Chief Fire Warden, Washington Forest Fire Association

IN discussing this subject from a technical standpoint, I would have you bear in mind that what I say has to do principally with conditions as they exist in the Douglas fir belt, west of the Cascade Mountains. The study of weather as it affects and controls the fire hazard has been more intense for this region than elsewhere.

On the charts which are here presented I have endeavored to tell some of the story of western Washington's 1924 fire season. It was unprecedented as to length and in the number of bad fire days—27 as compared with 23 bad days for 1922, the worst previous season. The loss in logs destroyed was approximately 21 million feet, as compared with 74 million feet for 1922. Logging equipment damage amounted to $260,000 as against $620,000, and there were 90 fires charged against donkey engines and logging locomotives this year, as against 135 from the same cause two years ago. This record shows that notable advancement is being made by the logging industry in fire prevention work. The season was ushered in on April 22, followed by three days of the most severe fire weather of the year—high temperature, low humidity, with easterly winds. This combination of weather conditions culminated on the 25th in one fire of large proportions and several lesser ones which caused considerable damage. The season closed with another disastrous fire on September 21 and 22. Thus our season extended over a period of five months as compared with a normal one of about three months' duration.

### *A Disastrous Fire in April*

CHART NO. 1 represents the area burned over —32,000 acres—by the large fire which occurred April 25. Loss in farm buildings, fences, schoolhouse, sawmill property and logging equipment is estimated to be $125,000. No damage was done to merchantable green timber, but practically all of the area burned over was restocking with a fairly good stand of Douglas fir, ranging in age from 5 to 20 years, and this was killed.

The fire was started by a rancher clearing land, burning debris at a supposedly safe time and in a supposedly safe place, but unexpected and extraordinary weather ensued. Dead ferns, fireweed, grass and other vegetable material becomes highly inflammable when the air is warm, and the relative humidity decreases to around 35 per cent or lower.

On the chart is shown a hygro-thermograph record for that week in April. (A hygro-thermograph is an instrument in which a cylinder operated by a clock is made to revolve, so that two pens which are operated automatically by a rise or fall in the temperature and relative humidity trace the changes, and thus the record for the week is made.) It shows that on April 25 the relative humidity reached the low point of 14 per cent and remained at that figure for 12 hours. It was below the danger point of 35 per cent for 20 hours. The temperature was around 75 degrees. Fire records for past years show that this combination of weather is always prevalent when great conflagrations occur.

The farmer who started the fire perhaps thinks the only loss sustained is in the farm implements, schoolhouse, logging equipment, etc., destroyed. The destruction of 32,000 acres of young growth "Christmas trees" is of small moment, for where they were located they probably would not be turned into dollars during his lifetime. He is concerned only with making a livelihood for himself. Little does he realize that the young forest destroyed has made harder and more uncertain the gaining and enjoyment of a livelihood by his children and their children. But he has not sinned against them intentionally. It is through lack of knowledge of the forces and laws governing the safe and sane use of fire. But the dead trees cannot be brought back to life, and the effect upon our future industrial life is the same as if the deed were wilful.

Chart No. 2 shows the area burned over—7000 acres—by a large crown fire on July 23. This fire killed 75 million feet of old-growth timber, 15 million feet of which was destroyed. The actual loss, including timber, logging equipment and fire-fighting expense, is around $175,000. The fire originated in standing green timber where a logging camp site, not more than an acre in extent, was being cleared. It immediately became a crown fire. The hygro-thermograph record for that week shows July 23 to be a bad fire day. Humidity touched the low point of 22 per cent. The temperature went up to 84 degrees. Conflagration weather again. The fire got out of control about 2 p. m., was driven by an east wind and covered almost the entire area in three hours. It was stopped by the influx of cool, moist air from the west.

GEO. C. JOY

There is a great deal less excuse, if there be any grounds for excuse, for the occurrence of this fire than may be made for the one in April. Notice that fire weather conditions would be critical was telegraphed or telephoned to logging operators the morning of the 23rd. To be thus forewarned there seemed no excuse for one who negligently allows fire to continue to spread, or who does not take every reasonable and possible precaution to prevent other fires being started. The courts have justly fixed an individual's responsibility in such cases.

### *What Happened at Eatonville*

CHART NO. 3 shows the area burned over— 15,000 acres—by the fire at Eatonville on September 21 and 22. The loss was around $75,000 in farm houses, barns, machinery, fences, telephone lines, bridges and logging equipment. Approximately 25 million feet of merchantable timber was killed and destroyed. One-half of the area burned over was covered with a good stand of second-growth fir and cedar, which was killed. The loss would be far greater, except for the fact that the weather was cloudy, with only immediately low humidity and temperatures —two factors which largely control the starting and spread of fires.

This fire was caused by the burning of slashings in a lawful manner, at a supposedly safe time of the year, when weather conditions were favorable. The work was done on the 18th and 19th of the month. No damage resulted therefrom. On the 20th a strong southerly wind began blowing and continued to blow, developing into a 43-mile gale in the afternoon of the 21st. Rain, which usually comes with cloudy weather and southerly winds, failed to materialize in the region of the fire, although it fell elsewhere near by. The result was that half a dozen or more fires were fanned into life, and uniting created one large fire which advanced with the gale over a two-mile front, drying out the debris and forest material at its head, and carrying burning leaves, moss, pieces of bark and rotten wood, to start new fires farther on.

You will note from the hygro-thermograph record covering that period that the change in humidity and temperature was slow and gradual throughout the time of the storm. From noontime on Saturday the 20th the humidity gradually fell from 62 per cent to the low point of 41 per cent at noon on Monday, the 22nd. At the same time the temperature rose from 55 degrees to 65 degrees.

The fire was the result of the continuous heavy winds, following a long period of dry weather. All forest material was dry and in condition to burn readily. The people who started this fire were not at fault, for they took every reasonable precaution which prudent people would take in choosing a safe time to burn, and there seemed the least likelihood that bad fire weather would ensue. They are the victims of circumstances, not anticipated, or over which they had control.

I have given you briefly the history of these three fires for the purpose of showing what combination of weather conditions cause disastrous fires, and that they can and do occur in spring and autumn, although not as frequent as in summer. The danger period is from April to October, inclusive, with the peak of the season hovering around July and August.

### *Danger Line in Relative Humidity*

THE research work carried on during the past three years, relative to the extent weather conditions affect and control the fire hazard, proves conclusively that a fire season is to be adjudged good or bad, more as the result of several bad fire days, than from a prolonged dry period. A day is designated a bad fire day when the relative humidity falls to 35 per cent or lower, with temperature of 60 degrees and upwards, other weather conditions being normal.

On chart No. 4 are shown parallel horizontal lines. The black one denotes the normal relative humidity at Seattle as taken at 5 p. m. The red line denotes the danger point—35 per cent—below which we count bad fire days. The chart covers the 150 days of the 1924 fire season. The irregular lines crossing the horizontal lines indicate the fluctuations above and below normal, as it occurred each day. The shaded red portions in these irregular lines indicate the periods of extreme danger.

Our fire reports for the season show that approximately 75 per cent of all fires occurred on days below this line. Ninety-five per cent of all damage was done on these dates. Our payrolls of fire-fighting expense show that 80 per cent to 90 per cent of such expense was incurred because of these periods. From the foregoing may we not conclude that forest protective agencies and logging operators must devise a system of protection adequate to meet the requirements of these emergency periods? The future of reforestation depends almost entirely upon our ability to do this.

In the Douglas fir region these emergency periods are caused by an influx of abnormally dry air. This is brought about when—in air parlance—a "high pressure" in air develops or passes east with its center over British Columbia or northern Washington, with a correspondingly "low pressure" in California or on the Coast. This induces northerly winds which are almost always very drying winds. The fire hazard thus engendered, increases with the passage of the "high" to the east and conditions grow critical with its advance to the southeast. These "highs" are quite regular in their movements. What is

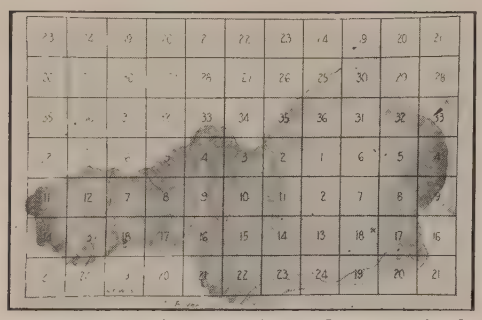


*Fig. 1a—The shaded area indicates the extent of a fire which occurred on April 25 on the Lewis River, in Washington. See Fig. 1b and Fig. 1c.*

termed a "high pressure" in air may be likened to a mountain of earth, and a "low pressure" to a valley. The air flows down the sides of this "air mountain" to fill up the "air valley." Each line of pressure represents one-tenth of an inch, and these lines correspond to contour lines on a topographic map. As with the topographic map, so with the mountain of air—the closer the lines the steeper the grade, consequently the air, like the water coming down the mountain, flows faster and gives us a strong wind when the lines are closer together. Air is constantly seeking a level the same as water, and that is why the air moves from a "high" to a "low" pressure.

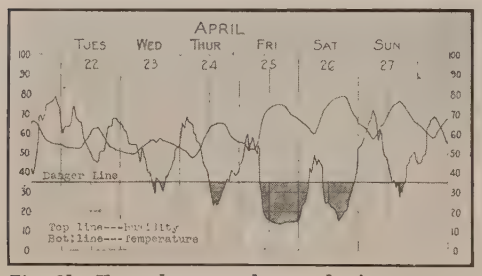



*Fig. 1b—Hygro-thermograph record of temperature and humidity during the latter part of April, which shows the fire days that were responsible for the Lewis River fire shown in Fig. 1a.*

Knowing the location and relative position the "high" bears to the "low" and the difference in their extremes of pressure, the trained weather will manifest itself over a certain area, and makes up his "fire warning forecasts" accordingly. A study is being carried on by the Weather Bureau to make these forecasts more local in their application. By paying part of

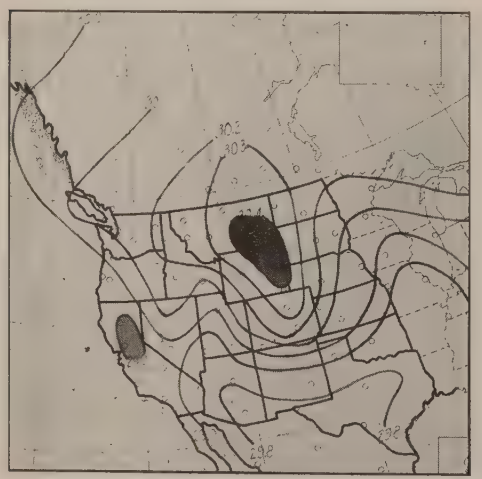


*Fig. 1c—The conditions responsible for the Lewis River fire shown in Fig. 1a were brought about by an east wind which originated from the high pressure area in Montana and Wyoming, as shown above.*

the expense, the forest protective agencies of western Oregon and western Washington were instrumental in getting the chief of the Weather Bureau to assign two meteorologists to make a scientific study and investigation of the relationship of weather to fires and the factors controlling fire conditions. Twenty auxiliary observation stations were established and from these weather data were gathered daily. This information was used to localize the general forecasts to fit the needs of the region.

During the season the Weather Bureau issued seven special "fire warning forecasts" and in every instance they were correct. To make effective the use of these "forecasts" in the camps, it is necessary upon receipt of one to immediately take extra precautions to prevent the starting of fires, extra guards put on duty, and everyone warned of the danger. If the spell of weather be severe and prolonged, it may justify the closing down of the camp. Some one person in the operation should be charged with the responsibility of looking after all the details of fire prevention and control, so that no time will be lost in putting into effect every protective measure.

### *Instruments Every Camp Should Have*

EVERY camp should be supplied with either a sling psychrometer, hair hygrometer, or a hygro-thermograph. These instruments are invaluable in indicating when fire hazard approaches the danger point, and taken in connection with the "weather forecasts" provide a sure index as to the severity of the hazard as it fluctuates. An automatic danger alarm is easily and cheaply made by combining a hair hygrometer, a dry-cell battery and an electric bell so attached that when the indicating hand falls to 35 per cent a contact is made and the alarm is sounded. A knowledge of weather conditions is a most important factor in controlling the fire situation. It is the all-important factor in burning slashings.

The portable forest fire-fighting pumps gave a good account of themselves this year and have proven to be indispensable in our work. Such equipment is not only of value in checking and controlling fires, but its greatest value is in putting fire out. One pump ran for 23 consecutive hours, and another has a record of 367 total hours' work for the season and is still in running order. The weak points which developed through hard usage will be strengthened and improved and the pumps made more dependable for our use another year.

Several forest protective agencies are working, spending time and money, to encourage the development of better fire equipment; to further the experimental and investigative work of the Weather Bureau to the end that this phase of protective work may be correlated with and find its proper place and scope of usefulness in encouraging, building up and perpetuating our forest industries; to perfect the work of our organization; to find and eliminate the weak points, so that better service may be rendered in co-operation with logging operators and others; that preventable fires will be prevented, and the huge losses in timber, logging equipment and other property will in the future be avoided. This is our objective—the goal for which we are striving. When this is accomplished—and it is not impossible of accomplishment—we may look forward to the possibility of a fireless, smokeless summer. So much for the technical end of our subject.

May we not profit a little by looking into the legal phase of the matter?

"He that kindleth the fire shall surely make restitution"—Exodus: 22-6. This language was used by the oldest of law givers some thousands of years ago. It was given as a fundamental rule of right, away back in the beginning when men first began to realize the need for some rule of law by which to decide matters. It has stood the test of time. It is written into our present-day laws and embodied in the decisions of our courts.

### *Fixing the Responsibility*

THE question of where a logging operator's responsibility with fire begins and ends is becoming more complex each year and is giving him more concern. Well it may, for surrounded as he is by the worst of fire hazards, and compelled to use fire in carrying on his operations, with the risk which attends the use of a large force of men, he is subjected to the danger of fires being started which may not only cause him a heavy loss but also cause a loss to his neighbor, for which he may be held accountable, and that through no fault of his own. In this respect the operator runs a great risk of being made the innocent victim of the cigarette smoker. It has come to pass that on sidewalks, in the streets, by the roadside, around depots and places of recreation, almost any day can be seen hundreds of cigarette stubs, smoking or blazing, literal firebrands. I am not certain that what I am going to say about this phase of the fire hazard will meet with your approval, and I would like it understood that what I do say is without animus and without the least disrespect for the person who indulges in this form of smoking.

So many fires occur each year—our records show 121 for this season—from this cause, not only in forested districts, but in farming communities and cities, too, that our attention is challenged, and we ask if it is not time to make more than a polite request of the manufacturers of this product that they put a warning of

*Fig. 2a—A fire in a Washington logging operation which occurred in July. See Fig. 2b for the hygro-thermograph record and Fig. 2c for the weather map showing the track of the east-northeast winds that caused the fire weather conditions.*

"Please Be Careful" in or on each package? If this article of commerce fell under the regulations of the pure-food law and the manufacturer was compelled to get out from behind the most artful camouflage known in advertising, and to stamp on each package the truth about what the ingredients of his noxious product were doing, and would do to the young growth—both men and trees—some real beneficial results would accrue to the coming generations of trees and men. The menace is so great that the state is justified in prohibiting by law its further in-

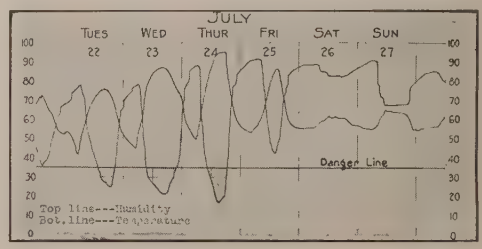



*Fig. 2b—The fire shown in Fig. 2a was assisted by the fire weather days clearly discernible on this record.*

dulgence. It is an economic necessity aside from the moral issue involved. There are other forms of smoking—pipe and cigar—which are far less harmful, and the danger of fire is so little as to be almost negligible. The best that can be said of it is that cigarette smoking is an obnoxious, useless and indefensible habit.

While our laws are fairly clear as to responsibility for fire, there are usually mitigating circumstances surrounding each case, so that quite often it is difficult to fix one's responsibility. It appears to me that the court's decision in such cases—of which there are a number—will give more light and be a safer guide for conduct than a perusal of the law itself. The decisions of

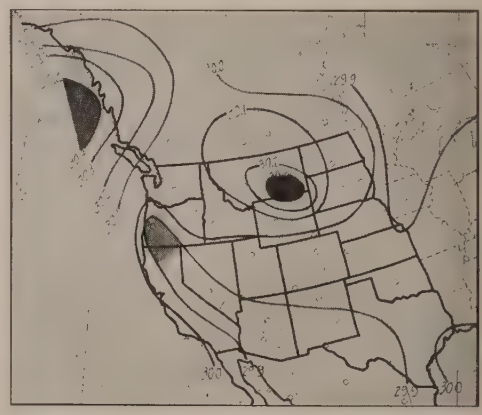


*Fig. 2c—The fire shown in Fig. 2a was fanned by east-northeast winds from high pressure areas in Montana and off the coast of British Columbia. The low pressure area was in southwestern Oregon.*

the courts of one state very closely follow the same line of reasoning as the courts in another, so our purpose will be served if we consider here the decisions of but one court.

Taking up the decisions of the supreme court of the state of Washington we find the court citing the following fundamental principle of law and justice upon which its decisions are based:

"Since fire, one of the most beneficent servants of man, does not from its own nature imperil surrounding persons and objects, the careful setting and keeping of it in one's dwelling house, shop, field, or elsewhere, for a useful purpose, creates no liability to another injured by its spreading, through some accident not reasonably to be anticipated. But a fire set or looked after negligently, if by reason of such negligence it is communicated to a neighbor's property and destroys it, will give the neighbor an action for the damage.

"The general rule in this country, as in England, is now well settled that when a private owner of property sets out a fire on his own premises for a lawful purpose or when a fire accidently starts thereon, he is not, in the absence of a statute to the contrary, liable for the damage caused by its communication to the property of another, unless it is started through his negligence, or he failed to use ordinary skill and care in controlling or extinguishing it.

### *A Few Cases of Liability*

"IF a fire started on the right-of-way of a railroad, or on land of a private owner by the carelessness of boys, the matches of smokers, or from any cause for which the landowner is not responsible, and the latter knows of the fire and knows that if not controlled it will spread and destroy valuable property of his neighbor, there is a duty to use reasonable care to prevent this result. This may not always have been the law, but it is now generally recognized that each member of society owes a legal duty, as well as a moral obligation, to his fellows. He must so use his own property as not to injure that of others.

"After one discovers fire on his premises he is bound to exercise reasonable care and diligence to prevent it from spreading so as to endanger his neighbor's property. His duty in this respect after discovering the fire would be the same as that resting upon a person who, without negligence, starts a fire on his own premises. He is bound to put forth such reasonable effort to prevent the fire endangering his neighbors as a man of ordinary prudence would put forth, who was actuated by a proper regard for his neighbors' rights and safety."

In another case the court says:

"It seems to us plain that when an owner of land suffers nuisance (in this case a logging slashing), such as the statute defines, to exist thereon, and receives notice from the state forester to abate it, he has a choice of two procedures: he may abate it by burning or other removal under the state forester's direction, or he may refuse, neglect or fail to abate it, and let the state forester abate it, subjecting himself to the liability of having his land charged with the necessary costs of the work. It is a mistake to say he is compelled in such a case to surrender entirely to the forester's judgment. While he is possibly required to follow the directions given by the forester, clearly it is always within his power to refuse to proceed if he thinks the forester's precautions inadequate, and within his power to take precautions in addition to those prescribed by the forester. In other words, if an owner undertakes to abate the nuisance of this sort by burning under the directions of the forester, he is an actor in the proceedings; a joint action with the forester it may be, but liable, nevertheless, for any loss caused to a third person by a negligent performing of the burning."

### *Rules Governing Responsibility*

SUMMED up from the foregoing is epitomized the following brief rules establishing and governing one's relationship and responsibility to his fellows as regards the use or occurrence of fire:

First—That one who lawfully, and not negligently, starts a fire on his own land or that of another, is liable for damage caused by such fire, unless he use every means, "a reasonably prudent person" should use, to control it.

Second—An owner of land is liable for damage caused by a fire which originates on his premises, regardless of whether or not he started the fire, if he knowingly allows it to spread, without using reasonable care and diligence to control it.

Third—Fire started for the purpose of burning slashings in compliance with the requirements of the law and the owner of the slashing exercise prudence and care in starting and controlling the fire, and some intervening cause spread the fire, he is not held liable for damage caused to his neighbor by such fire. This may seem like harsh treatment to the neighbor, but it is the established rule of the court. However, there seems to me to be a moral obligation resting upon the person responsible for the starting of the fire to at least share a part of the burden of loss with the neighbor. In such a case it is difficult to determine the ethics of right and wrong. The black and white blend into gray so closely that the line of demarkation is hard to distinguish.

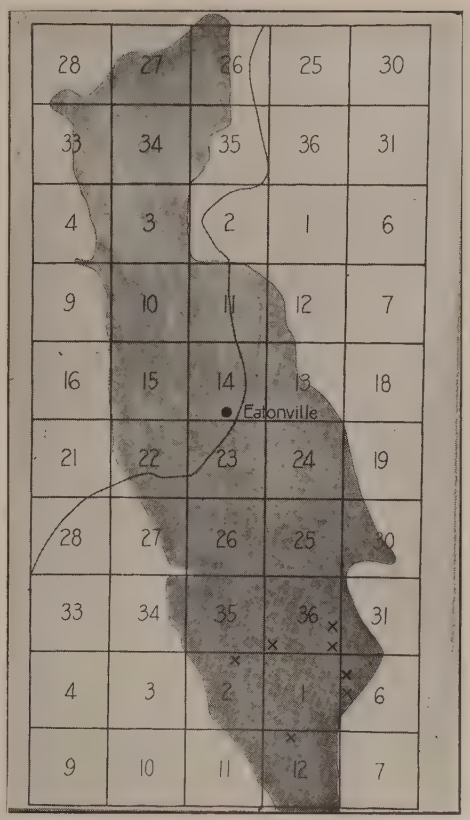



*Fig. 3a—The Eatonville fire which occurred in September. See Fig. 3b and Fig. 3c for the conditions causing the fire.*

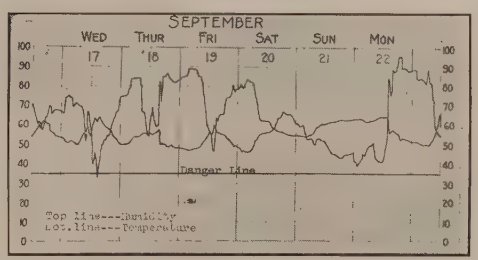



*Fig. 3b—The hygro-thermograph record of the period during which the Eatonville fire occurred.*

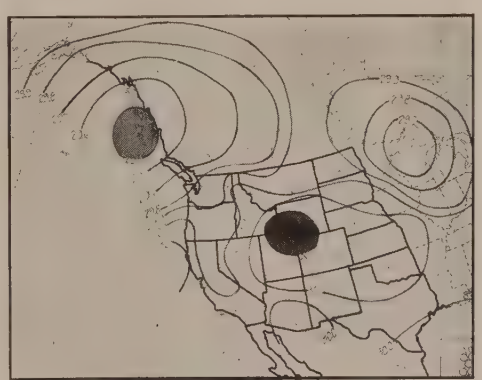


*Fig. 3c—Weather map of September 21, showing the high pressure area in Utah, Colorado and Wyoming and the low pressure area off the coast of British Columbia which produced the east-southeast wind that fanned the Eatonville fire.*

### *When Is a Man Negligent?*

ONE may inquire what is "common prudence," a tern so often used by the court, and when is one "negligent" for "liability for damage must be predicated upon negligence"? Is it not reasonable to presume that an owner of land is "negligent" when his land is covered with inflammable debris and he makes no provision to prevent fire starting or spreading on it?

Is not a logging operator "negligent" when he fails to provide all known practical means to prevent and control fires on his land or in his operations, and makes no effort to avail himself of "fire warning forecasts" or make preparation to meet and cope with such emergencies?

Is not the owner of a slashing "negligent" when he fails to avail himself of information regarding weather conditions before he sets fire to his slashing?

These are serious questions, for it is within the range of possibilities, in fact it is not improbable, that some day a fire originating in conjunction with the right combination of weather —as did the fire at Eatonville—will devastate a whole countryside.

There is another angle to this topic I want to mention before closing. In retrospection let us for a moment glance backward across the ages and take note of man's progress over the face of the earth.

In the beginning, God said, "Let the earth bring forth the fruit tree whose seed is in itself upon the earth," and to man He said, "Behold, I have given you every tree yielding seed," and it was so.

What has man done with his heritage of forest? The glory of the cedars of Lebanon are to be found in history only; the great forests of Europe have dwindled to such proportions that the needs of the inhabitants of that continent and Asio must be supplied from foreign lands; the pineries of Maine and New Brunswick, Wisconsin and Michigan, the Carolinas and the South; the hardwoods of Pennsylvania and the middle states are rapidly passing and will soon be only a memory, and here we stand on the shores of the Pacific in the last and most magnificant forest to which man has been made an heir.

It was ours for the taking. Within the span of my life have the bulk of the forests of these states passed into private ownership. Twenty-five per cent of the original stand has either been cut or burned already. All too soon will the remainder disappear. No longer can one lose himself "In the continuous woods where rolls the Oregon and hears no sound save his own dashing." These woods have lanes and rents made in them, and the great river now hears a multitude of sounds.

### *Annual Cut Is Enormous*

THE five Pacific Coast states, Montana, Idaho, Washington, Oregon and California, now contain more than half of this nation's saw timber. About one-third of the nation's annual lumber production, or 12,960,000,000 board feet, come from these states. If we allow 2000 feet per tree for every tree cut to make up this colossal amount, we find that 6,480,000 trees are felled annually; 21,600 every working day of eight hours; 2700 every hour. One does not now hear or notice their fall, it is too remote one from the other, but one may, if he will, visualize them in his mind, standing together as we know them, falling like grain before the reaper, and the sound of their rush and roar to earth like continuous peals of distant thunder.

The engines of steel and steam have slowly but surely made their way to the tops of the mountains, and there in triumph send forth their shrill blasts, bidding these monarchs of the

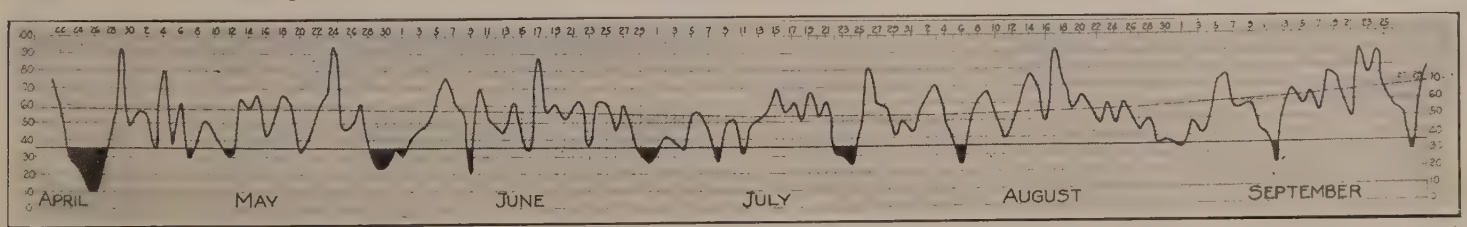



*Fig. 4—Normal relative humidity at 5 P. M. at Seattle, Wash., for the period April 22 to September 29, 1924, is indicated by the dotted line, beginning at 58 per cent in April and rising to 70 per cent on September 29. The danger point is 35 per cent, shown in the heavy black line. The deviation from normal is indicated from day to day. The heavy black areas below the danger line represent fire days with abnormally low relative humidity.*

forest, hoary with age, to come. And they came crashing, tumbling, sliding down the mountains to serve the purpose and needs of man. This is the harvest; you are the reapers. We would not have it different. But, as with David Starr Jordan's "What of the Nation?" is it not pertinent for us to ask "What of the forests of the future?"

Shall we abrogate to ourselves all of the blessings and benefits of this great heritage; a heritage which enobles and enriches and whose "shades are still the abode of gladness" and recreation—things which help to make life worth the living, and leave to our children as their heritage only bare hills, fireweed and fern, briars and brambles?

Are we not stewards only, and is it not our duty, nay, our obligation, to make provision for a new crop upon the land that the coming generations may find sustenance for a livelihood, the same as we?

Now is the time for us to do this; the undertaking is not so gigantic, but it demands action and the co-operation and co-ordination of every effort at fire prevention and control on a little larger scale than at present. It means painstaking care as to details, and the vigilance of everyone connected with forest protection and forest industries. There is no more effective way to accomplish our aim in this respect than to kindle in the child's mind while at school a vivid realization and apprension of danger in the use of fire. This danger and the value of forests to a people, financial, asthetic and authentic, should be taught in the public schools.

Cannot a nation which expends 25 billion dollars in utter waste of war spend a small part of the amount in building up a resource to bring prosperity and happiness to its citizency? Cannot the state afford to do more? Surely neither ought to be miserly or parsimonious in the matter.

It seems that only a few years ago—22 years, to be exact—that one morning, in a little town situated on the railroad between Tacoma and Portland, I awoke to find that morning had failed to arrive according to schedule. An air of gloom pervaded the land. In the pitch darkness of 9 o'clock a. m. people gathered in little clusters on the street corners, in the weird light of street lamps, and conversed in awed and solemn tones about the strange happenings. Others prayed or gathered at churches not knowing but what the end of all things was at hand; some were sure that this was taking place. Even the scoffers and unbelievers in God's being and power were not a little uncertain and discomforted. Surely it was not a time for them to speak too loudly at least. Everyone was in a state of nervous suspense. Presently the blackness gave place to a dull red and soon the whole heavens were illuminated with a bright red glare. This change was not such as to increase one's confidence that all was well. It seemed that a supernatural power had control of the elements—the world appeared to be on fire. But it was only the sun dispelling the mists of night and piercing the curtain of dense smoke which had been wafted over the land during the night, from the greatest forest fire that ever occurred in the history of the Douglas fir region. Sixteen human lives snuffed out and six billion feet of timber destroyed—almost in an afternoon. That was the cause and that was the toll. That can happen again. It can happen from your fire. But we hope to avert another such catastrophe as that, and we can.

By applying the knowledge gained through experience; by adopting every device of prevention and control; by observing the law, in letter and in spirit; by precept and practice; by making use of the science of meteorology through the trained and sensitive mind of the expert—listening in on nature's heart-beat to warn us of impending frowns. Then in our minds will be born anew a quickening and compelling sense of response to the "fire danger." Then will we be "fire wise" a nation fire conscious.

## Discussion

L. T. Kniskern: In the use of the hygrometer what location is most important for such an instrument?

Mr. Joy: It should not be in the sunlight but in the shade, where it would get the free play of air movement.

Chairman Murray: I might say in connection with the hygrometer that we have watched it like a hawk all this past year and it certainly has proven to be of real practical value, and also the warnings that we received from the fire association from time to time have been of immense help.

(President Stewart here took the chair and presided.)

President Stewart: The hygrothermograph will pay any fir operator a big dividend; if he will only get one and use it properly he will find it is one of the best investments he ever made.

Mr. Osgood, president of the American Institute of Electrical Engineers, is in Portland on a visit and has kindly consented to address us briefly.

### Greetings From Electrical Engineers.

Farley Osgood: As the president of the American Institute of Electrical Engineers I merely want to greet you as an association and to say that the electrical engineers are your friends. Electrical engineers help in almost every situation where mechanical work is going on. They are the newest development of engineers, only 40 years old. It is only about 40 years ago since the practical application of electricity became possible, and there is hardly anything that goes on now in which electricity is not a help. In your industry it is just beginning to come in, perhaps more in the milling of the timber than in the getting of it out of the forests, but you can't say when electricity is not going to be more help than it is, and I certainly want you to feel that the electrical engineers are your friends; that what they have is yours; that any information they may have is yours.

## Thursday Afternoon

President Stewart at opening of afternoon session called attention to an editorial on "Overproduction" in newspaper edition of 4-L Bulletin, a distribution of which was made at the suggestion of J. P. McGoldrick.

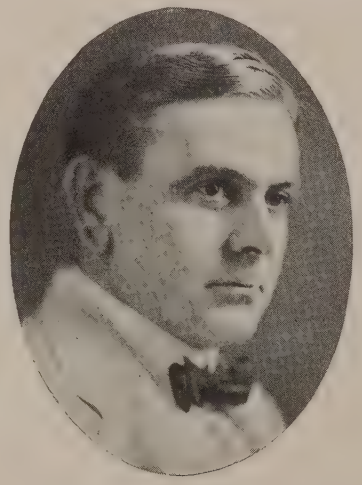
# Forestry Investigations Useful to Loggers

### By E. T. Allen

LAST year I told you forestry investigations are becoming of very practical importance to loggers. Also that because they realize this, many companies were asking the Western Forestry and Conservation Association to establish a research department to give the same co-operative advantages in this work, through its familiarity with all western forest problems, that it gives along other lines.

On April 1 we did start such a department. Although we now feel ready to serve others interested on the same basis, we restricted the work the first year, done at actual cost to us, to half a dozen large holdings chosen for the variance, distribution and representative character of their problems. To the general proposition as I outlined it a year ago, we can now add the experience of detailed discussion with these and other co-operating agencies, and of a season's field work. No other western agency, if indeed any other in America, has ever had such an opportunity to learn from a practical working combination of advantages—to begin with, wide knowledge of the region and its existing technical forestry information; then the counsel and interest of leading lumbermen and their woods superintendents, the co-operation of nearly all others who have contributory information, and the chance to apply all this on the ground to greatly differing timber, operations and cut-over land. The lands covered so far, over 130,000 acres, belong to the Shevlin-Hixon, Hammond, Weyerhaeuser, Booth-Kelly, the St. Paul & Tacoma, Michigan - California and West Fork Logging companies. Nothing has impressed us more than the great variation and at the same time its bearing on individual solutions. Questions of great importance were found that in the present stage of forestry knowledge cannot be answered, even by the best experts, without facilities for comparison. Even our syndicate system has in some of these questions done no more than discover them; the answer requires still more research.

Before discussing these, however, it may be best to restate the general situation. Forestry research is becoming necessary to the logger because of a change in conditions. He is confronted with business problems that he could once put off but are now either here or so close that duty to himself and his stockholders can no longer neglect them. This happens sooner or later in every country. It happens when either lumbermen or public, usually not far from each other in time, find it necessary to make calculations on one or both of two things—the maintenance of wood supply and the disposition of land. They are not quite the same thing. Often it is wood supply that gets first talked about, but it is use of land that generally brings up the first actual decisions to make in any region—for the reason that wood supply interests an in-



E. T. Allen

tangible, often distant consumption, with other supply sources also involved, whereas land use can be seen and dealt with, and must be, by the owner and by the local community.

That is where we have arrived. The community wants the land used and taxed, and will press toward what rightly or wrongly it believes to be of community advantage. The owner is less certain what he wants, aside from taking off the original crop, but he does, or should, see two things clearly enough he has the land and its burdens, with a very limited present opportunity to dispose of it, and he must adjust himself to unfamiliar conditions concerning it from now on, not to any past conditions. To do this intelligently he must know all that anybody can know of what it is capable of doing hereafter for him or for the public. Unless he studies things that heretofore it has been unnecessary for him to study, he can decide competently neither what he would like to do if he could, nor what compromise he is likely to be able to effect. If he lets someone else do all the studying, deciding, organizing and counselling he is staking his business and his stockholders' in a game wherein he has neither experience nor cards. The analogy is weak only in that he can get out of a poker game, but not out of this one. And he doesn't even know what his chips are worth.

Developments with a bearing on the subject have occurred since I talked to you last October. One is the McNary reforestation bill, which provides for a forest taxation study and for greatly increased federal aid in fire prevention if states and lumbermen join in making it apply to reforestation. This involves most of you directly. It will raise questions about your logging methods, slash disposal, policy of fire control around camps, and inclusion of cut-over land for patrol assessment or fire-fighting expenditure. By and large it points to your doing more than is desired in these directions, with the beneficiary public assuming costs not properly charged to your own benefit. Which means more must be known about what is really necessary in the interest of reforestation, what this really need cost, and how such cost is fairly chargeable to the public and to you either as an operating cost to be passed on or as an investment upon which you may be expected to realize. Meanwhile, state legislation will be suggested to cover such points. There should be. The question is what kind?

Another development is somewhat related. It is the appropriation secured by Senator McNary for governmental forest experiment and study in the Pacific Northwest, which will deal largely with just the questions I have mentioned. This should be most helpful, but is added reason for the industry's interest in the subject and for its co-operation in order to have the right questions wisely studied.

Further is the question of state or federal acquisition of cut-over land, which some think will be a partial solution. If it is, it will be a

question of values for future use, requiring expert appraisal on both sides and determination of how far it pays to go to enhance these values. And finally, there should be attempt at least to have taxation predicated on actual earning value instead of upon mere demand that cannot long be met.

Thus there are clearly two aspects of this need for getting practical information bearing on forest land policy. One concerns getting what will help the owner decide his own best interest as between retention and disposal; including, if the former, its most profitable use, and if the latter, its most profitable disposal. The other is getting co-operatively, and using in an effective way, the information to prevent unwise public or industrial policies. It will do no one much good to determine a useful individual policy which cannot be carried out. The company that proceeds only individually, no matter how sincerely, is traveling a dangerous highway on one leg. The traffic may not turn out for it. Whereas a stageful, having a destination, a minimum of doubt about the crossroads, and a heavy load of reliable information, has a fair chance with the best of them to keep right-of-way with speed and safety. Teamwork for a few years, until public reciprocity is clarified and dependable, is an essential that must be added to investigation.

### *Three Distinct Problems Involved*

IN either case the points to be investigated are much the same. They fall in three distinct divisions, although hardly to be kept apart in arriving at conclusions. There are timber problems, operating problems and cut-over land problems, but the prospects of cut-over land are affected by logging policy, in turn affected by timber conditions. I shall try to show you how their interlocking works out and where lack of information anywhere may affect the entire enterprise. But first, for I have dealt so far in generalities, I shall outline a few main points that usually need study, so you need wait no longer to learn what I am talking about.

First is appraisal of cut-over land and its possibilities. This goes not only into the condition of the land and its treatment, with its possible uses and costs to the owner, but also into the chances of exchange and sale, with the fullest knowledge of public trends and requirements.

Second, the checking of growth and yield estimates, which can be reliably used and can also be astonishingly tricky.

Third, the handling of fire from the straight protective angle, the reforestation angle, and the cost angle. This touches slash disposal and logging camp fire organization, as well as general patrol policy and cutover land protection. Hardly anything demands better contact with the general trend of such movements, or on the other hand more intelligent tract adaptation.

Fourth, in many cases, the situation of well-advanced second-growth in the neighborhood which is about ready for cutting. Often this should be considered and perhaps purchased in connection with plans for logging, railroad building and fire-proofing. As a rule little is known about this, although in every timber country the very highest returns often come from acquiring it cheaply just before merchantability establishes a new value.

Fifth, mature timber and logging studies along lines not heretofore experted. These include age of timber, and its bearings on management, especially as are involved disease and the prospects of low-grade material, mixed woods and unusual species. In some regions disease defect, and its habits, are highly important in connection both with the time to cut a tract and with utilization in cutting. And, of course, there are many forestry controversies over cutting methods.

Finally, all these things, and others, need analysis and calculation along unfamiliar lines, and use of the information in the language and ways of those who make it their stock in trade, and with them, sooner or later, you must deal.

### *What to do with Cut-over Lands*

LET us begin with cut-over land, which probably comes first to mind as a puzzle with several possible solutions, such as sale or exchange, abandonment for taxes, independent private forest-growing, and contracting with state or government so you handle the land in a productive way and in return are guaranteed certain related public timber, thus assuring both sides the future of a desirable long-term operation that makes the most of a jointly owned natural unit. Anyway it is a serious puzzle. There are nine or ten million acres of it on this Coast and soon there will be twice as much. We own it and will own more. We are learning not to hope too much from agricultural disposal, but the public demands that it be kept useful for something. It is taxed. Someone must keep fire out of it. It is stockholders' property and stockholders' liability. Often we cannot even abandon it. Some time, when the uncut proportion becomes small enough, the cut-over proportion becomes the biggest problem. It comes near being that now because we know less about what to do with it. Before any owner does know there are certainly four things he must learn: How to value it; how to improve its value; how it might be used; how it might be disposed of.

So, by way of illustration, suppose you decide to study these four things on a typical fir tract. Obviously the first step is classification of the land. First in this is what it is most useful for, usually as between agricultural and forest production, and let us say a part, usually small, is considered promising enough for agriculture to be dismissed from any present forestry calculations. This will not be as big a part as formerly, for three reasons: One is that operations are pushing back into the mountains. Another is that the trend of our population is to use less land more intensively, rather than to reclaim more land. The third is that the most direct result, when you set up an agricultural value, is to raise nothing but taxes. Anyway you so classify a portion and take up the remainder.

### *Another Reclassification Required*

THIS has to be classified again, if you want anything of much value in determining a policy for it, so as to bring out the comparative advantages of using it yourself, trying to sell or exchange it, or abandoning it for taxes. The wise man will start with mighty little previous belief to prove, because, besides comparing his region or holdings as a whole with other competing regions and holdings, he must compare different portions of his own and will likely find them to vary greatly.

What are the climatic and other advantages for forest growing: good, bad or indifferent? There is almost as much difference as in lands for potato growing.

What species will you get and where will they stand in future markets?

How good will the restocking be and how soon will it be assuredly established?

How fast will it grow? When will there be a usable crop? Of what products?

What are the protection problems and costs, probably greater in the future than now, if the system is to be dependable?

How about future accessibility and transportation, perhaps better or worse than now?

Are there any by-product possibilities, like grazing, or thinnings? The latter might increase production besides paying carrying costs.

What are the tax prospects? How do all estimated carrying costs figure as against estimated crop returns, for the periods indicated by all the other calculations?

### *No Established Rules to Follow*

NONE of these things can be taken from general tables. They vary with your lands as compared with other lands and with averages, also vary inside your holdings. But they are just as important in intelligent disposal as they are in intelligent retention, protection and use.

Probably the quickest indications of your study are these two: First, that the condition of your cut-over land, consequently its promise of future value to you or anyone else, including ability to pay taxes for long, depends much upon your past policy or luck in handling fire. And to lesser extent upon other operation policies either voluntary or enforced by past markets. Hence the cut-over land you now have may vary within itself for this reason, and also afford a very different business proposition from that which it is possible to create in operating from now on. The difference, if there is one, is important in figuring out both your land and your operation policies.

The second thing the study is likely to bring out quickly is that the rules foresters have promulgated as necessary to get reforestation, and the results they predict if these rules are or are not followed, may be unreliable applied to your tract. The reason for this may be either too broad averaging or two narrow observation. There has been neither enough widespread research, nor enough localized research, nor enough correlation of the two with no theory to support, to permit answering some very fundamental questions about what will happen on your land if you do or don't do certain things. Which may affect your hope of reward or fear of punishment.

### *How Quickly Does Seed Germinate?*

FOR example is the belief that fir reproduction is mainly from seed stored in the ground and germinated by light when the old stand is removed, hence that unless slash is burned promptly the fire may destroy the quickly started seedlings. This seems theoretically sound, but actually there may be a gradual restocking, with a wait of years before the new stand is well established—and nobody yet knows why. Our investigations this summer prove that apparently identical conditions will produce different results. Wherein they were really different, and what this teaches, may take all hands a long time to find out.

Which means this: That until more is known about the re-seeding of fir, and the effect of methods already started, however small they are, but if they are not visibly started you cannot tell within 15 years, which is roughly the period of possible wait for gradual filling in from delayed sprouting, wind-blown seeds, and the seed-bearing at 12 or 15 years of the few that virtually always do appear promptly.

Economically this is very important. It means that both sides are right when one says fir reforestation depends on the right treatment and the other side says all fir land is restocking if only protected from fire. It reduces to a question of time, and time is money. If the public is conducting the enterprise, the question is less important, for the public commands time and cheap money and can take a chance knowing it will get the crop just the same with a little longer wait. But a private enterprise that might safely calculate profit on a 50-year rotation after logging might also find that compounding costs for 15 years longer would more than destroy it.

Do you see now why I say competent classification is important, especially until together with research it begins to establish more information? It shows the difference between land with evidence and land with a guess, and is starting us on the road to clear up the guesses. Meanwhile you need to know where to trade the guess and keep the evidence, if choice is possible, and in any event to know if the other fellow is giving you the straight dope. Again, you don't want to invest much in changing your methods, or to have anyone change them for you by law, until there are reasons that reliably fit your particular conditions.

### *Relying on Visible Evidence*

THERE are some things that can be guaranteed from the evidence the land shows and some that cannot. The latter usually, although not always, lead back to operation, slash-disposal and fire-handling. It is important to know whether they do, or to some other still unknown influence. In any case, the division between certainty on some lands and uncertainty on some lands and uncertainty on others requires study of lands, methods and natural conditions together, and it almost always takes evidence elsewhere that your lands lack.

One place it takes you is to existing second-growth stands of different ages. If you have not these near by, you need facts shown by those elsewhere but with dependably similar conditions. They prove what a new growth will do. But that is not all. It certainly would interest you if there is some well along second-growth that might come out with a road to tap your old timber, or if you are figuring the life of your operation, to find that an absolutely comparative stand is right now, on today's market, cutting out 100,000 per acre from timber averaging 75 years old that came in on a burn of about the year 1840. And that with a little more liberal standard, such as may be expected, perhaps as much could have been cut at 60 years. We have seen this. If the re-seeding is prompt, it is what you can get as a maximum in some Coast localities and in some localities in the Cascades high enough to get the same rainfall, but it is not a figure for general use. There are equal exceptions in the other direction. And I, for one, refuse to set any average. Averages are dangerous.

### *Second Growth Study*

THIS sort of thing quickly leads from cut-over land study to second-growth study, with all its ramifications of quality, age of slowing down in volume production (usually around 60 years), assessed tax valuation, and like calculations. Especially for those who have or can buy cheaply low-taxed stuff that may work in nicely with future old timber operations. Which again leads to the nature of these future operations in order to handle both kinds economically. And perhaps to a different decision as to when the old timber can best be opened up. Is it very old and defective? If so, may it not be better, instead of hastening operation to salvage it when there is small profit in lowers, to wait until not only available second-growth, but also mixed woods, and alpine species on the high ground, and the low grades in the defective old stand, all combine to bring more because of better future markets and of more return on the same railroad investment?

To judge this requires knowing what these different growths will do meanwhile, and no less what the defective old stand will do, so the owner's survey reaches to conk investigations. I cannot go at length into what these involve, but assure you they are intensely practical and needful; going to show that the advance of disease is slower than is often believed, that it depends upon age and other determinable things, and that the defective content of trees can be quite accurately given by those who know its habits.

Then you may be brought once more to the interlocking aspect in some such way as this: You suspect that through such conk investigations the defect where you are operating can be appraised much more closely than untrained fallers are doing it, especially if paid by the

thousand, so quite likely falling and bucking costs can be lowered $50 or $75 a day by expert marking of trees to leave provided it is reliable enough, on the average, not to lose stuff that would pay for falling. Also that the reforestation value of the land, for use or for trading, may be increased by leaving them for seed trees. You know the government, a possible purchaser, wants them left. Also that the kind of slash burn you get, and later fire risk, are affected by the volume of wood fallen but found not worth taking out. But you are now tranching on your logging superintendent's business. The only good way to get anywhere with such theories is to take the theory out of them, without any preconceived judgment, by testing them with him on the ground. Have someone with the expert training try out his marking; then fall some of the trees to see what they do contain and leave others to see how they survive slash-burning and wind. Perhaps you will finally compromise by leaving those farthest from spar trees, where the work of bringing them out more than balances the chance of losing a good log now and then. This is the sort of experiment we are making, with the aid of government experts, and with it we are trying to find whether someone connected with each camp can be taught the dope or whether it need be specialized.

These are fir questions mostly, which I mention more specifically because a meeting here has a majority fir attendance. But pine lands have just such questions of logging methods; like high lead and donkey speed damage to uncut growth, brush disposal methods, and the pros and cons of leaving small trees to be speeded up in growth so they can be more profitably logged later, that will never be settled without investigation by lumbermen on their own lands with their own business angles in mind. By the way, we have found in pine cuttings where small trees that were left have added three inches in diameter in seven years, due to increased light supply, and actually grew more wood in these seven years than in the 57 that was their age at the time of logging.

### *Relation of Fire Hazard*

SIMILARLY related and interlocking are burning policies, not only with slash but also with cut-over land near camps and mills. Reforestation for its land value enhancement, or interest in another crop, may be no more important than its relation to fire hazard in substituting a protection belt of green young growth for a far more dangerous fern and weed-covered area which threatens logs, equipment and railroads every year, and gets worse the more it is burned. The question is how quickly, surely and cheaply can you get this better protection. Here again you likely deal with operation and the logging superintendent's province. Better than either instructing him on a guess, or neglecting the matter altogether, is giving him the help to reach his own judgment and the help to carry it out without interfering with log production. Also you are very likely, in the near future, to need these points studied in order to determine your concessions to forestry and protective agencies who urge certain policies from a general angle without recognizing peculiarities that may lie in your situation. The McNary law will add impetus to the already rapid trend of legislative and other interest in just such points.

I cannot follow this big subject much further into its details. Of course such investigations involve many I have touched barely or not at all, such as taxation questions, right-of-way and damage suit values, all sorts of yield and interest calculations, and the way all the information can be digested in reports, maps and tables for use individually or co-operatively. Nor shall I now discuss a hitherto unconsidered sale possibility—to organizations that might be accomplished, of capital seeking long-time investment, to take over either agricultural or forest-growing enterprise. I have only tried to suggest the relation of the subject to you and to the industry as you are both becoming forced to deal with it. Much of such information is easily gained. No less important is discovering that which is not, but must be followed as far as is necessary.

There is a place in this for all concerned. The government the states, the forest schools and the private foresters have each their responsibility and there is plenty for each to do. It is obvious, however, that loggers and land owners have equal interest and that unless they also take part individually and collectively they will suffer, both individually and collectively, from failure of this interest to be applied practically or given credit and hearing. It is obvious further that the individual concern not only shares this general interest, but often needs to profit all it may by a study of its own situation.

### *Co-operation Is Invited*

IN our own connection with such work, out object is not to discourage or supplant any effort by other agencies, but to encourage all that may be obtained. We believe, however, that two things are important—to get the fullest co-operation in making it all available and to weigh it impartially without being influenced by commitment to any theory. As a co-operative agency we are responsible for both of these things, so they are necessarily the policy of our research department and its syndicated investigations either as we make these ourselves or in co-operation with the government or others. We try to attack every problem without bias for or against any possible conclusion, to get the cold facts, and then to see what they indicate.

So far they indicate that the solutions will be almost as various as the conditions. That forestry knowledge is in a state of flux with a good deal of revision probable. That until then, also after then, rules should not be general, but very flexible. That no single ownership will prove logical, but that lumbermen, states and government will each hold a proportion suited to their needs and opportunities. And that while such a division cannot be completed until after many years of establishing a sound basis for each ownership, a great deal of land does already suggest its proper classification and treatment. This is the service we are trying to give you.

I might say that, while I have talked a good deal about fir, I have just come up from California, where the pine lands of the Michigan-California Lumber Co. were investigated. Their reforestation is just as good and as fast as ours up here, and with them just as it is with us, if fire is kept out, the timber will grow.

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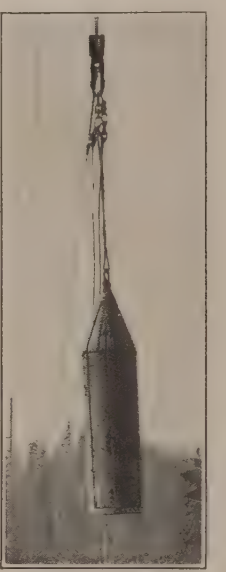
President Stewart: Last year, for the first time, we heard the subject of skyline oil tanks was brought up. I would like to ask someone who has used them to relate his experience.

## Skyline Oil Tanks

JOSEPH G. MORGAN: Last year I told the Congress about some oil tanks we were using to transport oil from the railroad out to the yarders, whatever distance the skyline might be. Now we have used them a year and three months. We have the same three tanks; they are doing the same work, and they save us a good deal of labor and expense in piping oil. They are made to hold about ten barrels of oil, which is a little more than one day's supply for a yarder. We hook them onto our skyline and take them out into the woods wherever the yarder is, and in that way eliminate any wood cutting even for firing up. If we are using the donkey away from the track we can also switch our machines around. If that machine has to come back to the track it is still an oil burner when it gets there; we don't have to make any change.



*Skyline Oil Tank*

We load these tanks at the landing and take them out over the skyline. When they are empty we bring them back. The men in the woods call them torpedoes. They are of a cylindrical shape, with a pointed end, and they can be dragged through mud or through logged-off land, or over logs, or swung through the air like a log on a skyline. They are very heavily constructed so as not to get dented, and so far they have been very successful.

Mr. Meserve: I would like to know how the oil is taken out of the tanks.

Mr. Morgan: On each of our donkeys we have a little pump connected right to the boiler, and we drop a flexible hose into the torpedo tank as it is alongside the sled and pump it into the donkey tank.

Mr. Meserve: Do you have a special reserve tank on the donkey?

Mr. Morgan: Yes; we have the usual tank on the donkey.

Mr. Erwin: In using oil tanks we found that as long as our yarder was on the same elevation as the road donkey or downhill from the road donkey we had no trouble at all with the torpedo tank, but when the yarder was several hundred feet higher than the road donkey, although we used seven-eighths line, we could not skid it back up there, and in those few cases we had to resort to pumping the oil out to the yarder. Otherwise, when the yarder was on the level or downhill from the road donkey, it was an ideal solution of the situation.

# Who Makes the Cookhouse Break Even or Better?

PRESIDENT STEWART: I find on the program a very innocent-looking question, which is, "Who Makes the Cookhouse Break Even or Better?" That reminds me of a talk I had last spring or winter with three logging operators, and it developed between the three outfits there was a total loss of over $20,000 in their cookhouses during the year 1923. I believe it would not be out of place to ask every man who is operating a camp who is present, and who can make his cookhouse break even or better this year, to stand up and let us take a look at him. I will sit down.

C. G. Nogle: In two years I have had no difficulty in making cookhouses pay.

President Stewart: Where do you operate?

Mr. Nogle: The Potlatch Lumber Co., in Idaho.

President Stewart: How big a crew do you have in your cookhouse?

Mr. Nogle: We are cooking for 60 men.

President Stewart: What do you charge for board?

Mr. Nogle: $1.20 a day.

President Stewart: How often do you give them chicken?

Mr. Nogle: Once a year; outside of that I give them anything they ask for.

E. G. Polleys: We make our cookhouses pay when we get them up to 50 or 60 men.

President Stewart: How many men are there in your crew ordinarily?

Mr. Polleys: We run 40 to 60 men in the crew.

President Stewart: What do you have to pay your cook for that size crew?

Mr. Polleys: We pay him $150 a month.

President Stewart: Do you feed them pretty good?

Mr. Polleys: Yes; we don't have any complaints.

R. D. Moore: In our logging camp we are feeding 75 men, and up to and including June 30 the cookhouse had netted $550. On the other hand, the Mill camp, which feeds between 35 and 40 men, sometimes a little less than that because we have so many families at that end of the line, in the same period showed a loss of $250. I have to admit that the woods camp puts more on the table than I ever saw in my life, but it is a fact that the men are well satisfied and we have very little turnover. Recently we lost our cook, so how we are going to come out for the balance of the year I can't say.

E. C. Moore: I want to say that there are a lot of fellows here who at the last Logging Congress had dinner at our camp, and I thought when I saw them finish that none of them had had anything to eat for a long time. That is evidence that we feed as good as anybody, and we make our cookhouses pay in camps from 30 men up. We pay our cooks $125 a month and give them 20 per cent of the profits of the camp. We charge them a little depreciation, and we have been able to make our cookhouses pay the cook $20 or $25 a month on this 20 per cent when feeding 30 men. I believe that the reason there are so many cookhouses losing is that no one looks after them. In that part of your business where you take some one's word for it, there is going to be leakage. You may not find it out for two or three months, until you take off the cost account. We have devised a system by which we check our cookhouses every night. We buy nothing but solid packed stuff. Everything we buy is of the best, and we attempt to keep cooks that are good cooks. The method we use enables us to have the same cook usuually year in and year out. Once in a while when we close down we may have a little time when the cook doesn't do anything, but we pay him. We take that little loss. But at the end of the year we have always found we have made money from our cookhouses.

President Stewart: Mr. Moore, what kind of a man do you have to keep this definite data which is required to let you know every night just how your cookhouse stands?

Mr. Moore: We weigh everything that goes into our cookhouse; our bookkeeper goes in every night and checks up with the cook on the particular needs for the next day. We keep a store at our headquarters and charge our cookhouse 10 per cent above the wholesale price.

That merely gets you by with the freight and the handling. We don't pass it into the cookhouse in great big chunks or carload lots, but the cook gets his stuff every day, or practically so, from the store, and the stuff that goes up to the other camps we inventory every Saturday, and on Monday morning we have that sifted down so the cook gets an absolute showing as to whether he made or whether he lost.

President Stewart: That applies to every camp, not only your headquarters but to all camps?

Mr. Moore: That applies to every camp. We get the cook to figure he is working for himself, not for us.

President Stewart: What do you charge them for board?

Mr. Moore: One dollar and twenty cents. We buy our stuff in big lots, so that we get the benefit of whatever discount may be obtained. We buy from 25 to 100 cases of milk at a time and get 15 per cent off.

President Stewart: Did you ever have a steward take charge of your cookhouse?

Mr. Moore: No. Have checked over this plan and have found it a failure, for the reason that it did not get to the logging superintendent's attention each day. I believe that the logging superintendent ought to be able to tell the general manager, and the general manager ought to be able to pass on to the president of the company at least once a week the particular cost of his logs and what his cookhouses are doing. If there is a leakage I always have believed in the old problem that two heads are better than one. Believe there has grown to be too little co-operation between the managers of the lumber companies and the superintendents. I sometimes feel that in order to have the cookhouse pay, and a lot of things like that, it would be a good thing to have the golf links out at the camp.

Mr. McGillicuddy: Mr. English, I believe, has adopted a rule of thumb to check up on the cookhouse, and that is to watch the pigs.

### *Closer Supervision Neeeded*

R. W. Vinnedge: We have usually a very steady crew of cooks, and generally we make a little money. We instruct our cooks that we are not operating the cookhouse for gain, but we want, first, to keep the men, and we have a certain standard with which we acquaint our cooks and tell them, the first thing, that they must live up to that standard in the standpoint of quality. We give chicken every other Sunday with ice cream. During the fruit season, just as soon as strawberries and fruit of that kind get anywhere within hailing distance we have them. It does seem to me that some of the things Mr. Moore has said, barring perhaps the golf features of his talk, are very pertinent. I don't play golf, by the way, Mr. Moore. I think we ought to check up our cookhouses a little closer. We have thought at times that perhaps we would put in the percentage method, but we tried that once and our crew found it out. Unfortunately, we had a poor cook, and you know the answer. We inventory once a month, and we have a very minute statement showing the cost per man per meal on every major item. I think we have 25 items. We inventory it of course in order to arrive at the cost. Our experience has been that our men are better satisfied if we can have a cook on a regular wage basis, particularly if they know it. We pay our cooks $175, and we have paid as high as $200 for a first cook and $125 for a second cook. At the present time we are running one cookhouse at a profit and the other at a loss, for this reason: We have found that the twilight zone between a profit and a loss is about 90 men. One camp we have is a one-side camp at present, and it has but 65 men, and I think last month we lost $125. Our other camp, the headquarters camp, has two sides, with some construction crews, and we feed about 120 men. From 100 men on it is pretty much velvet. With the larger camp we have seven employes in the cookhouse; five in the smaller. You see there is quite a disparity there, and it shows there must be a point somewhere between 65 and 100 men where, with due diligence, the profit should begin, or, at least, the breaking even should begin. When I say that we make money it is so very small it will be almost considered breaking even.

President Stewart: What do you charge for board?

Mr. Vinnedge: Forty cents a meal. We serve fresh milk three times a day in both camps.

### *Cold Storage Facilities at Camp*

Mr. Moore: We keep an ice plant of our own at our headquarters camp where we make ice, and have a big storage in connection with which we take care of our beef. We can keep beef just as long as the packing house can; so that gives us the privilege of buying beef in bigger quantities in order to take advantage of the market. You will find this a big benefit. Last year I visited the Craig Mountain Lumber Co. I spent a week over there, and they gave me the privilege of checking up their cookhouses. They had made up to that time that year $3300 from their cookhouse. I had good meals and I ate in four camps.

R. S. Shaw: Our meals have been costing us this year slightly under 38 cents. We are feeding, I think, about as good meals as you get in Portland for about $1.50. We serve fresh milk; we try to buy the best on the market; and in making our meals cost 38 cents we depreciate at the rate of $100 a month to take care of the equipment, and also we charge off $50 a month for lights and $50 a month for fuel. While that, of course, don't take care of the fuel, nevertheless it is the monthly charge and it helps take care of that cost.

President Stewart: What do you do about stoves and dishes? Do you capitalize those or put those in the expenses?

Mr. Shaw: Those are taken care of as they are bought each month.

President Stewart: That is, they go into the expenses each month?

Mr. Shaw: Yes.

President Stewart: Do you use any particular system of handling your cookhouses, or the rough-and-ready system, just like most of us do?

### *Bonus System Not Successful*

Mr. Shaw: Our cooks are paid by the month. We have tried out the steward system; we have tried out the system of bonusing the cooks. The men always find it out, with ensuing trouble, in my experience. We inventory at the end of every month, and we have 15 or 20 items of foodstuffs taken care of each month, and we figure out the percentage of cost on each kind of food per meal, and in that way we seem to keep pretty good track of it. Nevertheless, last year we made a little money; we didn't make much—you might call it the same as the cost. We don't want to make money out of our cookhouses. We want to give the men all there is in it, but we don't want to lose any.

Mr. Moore: It seems to me that everybody seems to say as soon as they let the men know just how they are running the cookhouse they have trouble. That does not appeal to me, the way you apply it. It doesn't make any particular difference whether you feed them well or not, if the men have the privilege of trying to run the camp. We have all got to run our camps and not let the men do it.

Mr. Meister: We are not in the minority at all. We lose some money.

President Murray: What do you charge?

Mr. Meister: Forty cents. We lose 5 cents a meal and charge them 40 cents. We keep a very complete record that we get out every month, showing the pounds per meal and the cost, and still the loss goes on.

Mr. MacGregor: I would like to ask these gentlemen who say their cookhouses are breaking even what goes into the cost. In our operation we charge into that the bull cook service and the wood and the light and everything connected with the camp. We don't break even.

Mr. Moore: To what do you give credit for the bull cook's time and the money that he makes?

Mr. MacGregor: He doesn't make us any money.

Mr. Moore: He doesn't do anything?

Mr. MacGregor: He keeps camp.

Mr. Moore: Well, then, he ought to have credit for something. We charge $1 a month for our beds; we charge 25 cents a day for the first four days. If you have 100 men I think you will find, the way our men move around now, your bedding will make you $150 to $175 a month. We allow depreciation for our bedding. We do our own laundering at the camp, and whatever is over on the amount we collect for bedding above our depreciation and the cost of laundering we credit the cookhouse with and charge the cookhouse up then with the balance of the bull cook's wages. So we figure the bull cook is working all the time. A man who works on the job, if he does his work good, must make you a little something at some place.

Mr. MacGregor: The difference is, we don't furnish the bedding in our camps. We consider just the meals and the lodging, the boarding of the men, for which we charge $1.20 a day; therefore we must charge the bull cook's time to that account, also the wood and the lighting.

### *Place Responsibility on Cook*

Paul E. Freydig: We are not making any money on the cookhouse but we are trying at least to break even. We take an inventory; we have a certain number of segregations, such as pastry, flour, sugar, etc., so as to get an idea of how the different items run. Then we enter against the cookhouse all the wages of the cookhouse. Charge half of the bull cook's time against the cookhouse; also the hauling charge and freight. Charge 40 cents a meal, feed about 60 men, and some months we break even and some months we don't. The thing we have been wondering is about the quality of the food, and whether we save in buying a cheaper grade of food or in buying the best. It depends a lot on the cook. I think the best system is, regardless of who is running the cookhouse, to have the cook feel that it is up to him to keep the men satisfied, feed well, cook his food well, but at the same time to keep his expense down. Month before last we gained a little in the cookhouse. We went over all the invoices with the cook and checked up carefully to see whether any mistake was made. Next month when we checked up—by this month meaning September—we were behind a little. We found that the trouble was the cook figured he had a little leeway and cooked up too much cake, cream puffs, and a few things like that. We don't feed chicken or ice cream, but we did find out that they run too heavy on the pastry.

J. C. Flora: We have kept very accurate costs of the cookhouse. We don't itemize it, but we take what we buy per month, then we credit for the meals and see how much is left; and the dishes and items that are broken in that month are charged right up to that month. Last year we lost about $5000 on the cookhouse; this year we are making some money. I don't think we are charging any rental to the cookhouse, but we charge the wood and all the bull cook's work to the cookhouse. I think it is up to the cook. We have a cook now who is making just about what we lost last year.

Mr. Moore: Did it take you a year to find out that your cook was losing you a lot of money?

### *Took Loss to Keep Men Satisfied*

Mr. Flora: No; we knew every month. We operate on the basis that we are trying to keep the men satisfied, and things were going along all right, so we just figured the cookhouse as a necessary part of the operation. We have had many cooks, and I have never been lucky enough to have the cookhouse break even until this year. This fellow we have has handled cookhouses for himself. I guess he takes more interest in it than we do ourselves. But in losing money in the cookhouse it is not so much what you furnish but it is what goes out; it is whether the fellow is a good guesser or not. If he cooks up a little more than he can possibly handle it is going out. We are feeding about 200 to 225 men, and there are a lot of men in one place. It is pretty hard to get a cook who can handle that many men and keep him.

President Stewart: I venture to say the total losses in cookhouses throughout the West amount to a tremendous figure every year, and it has always seemed to me a totally unnecessary loss. I do feel the prices we charge for feeding men are high enough, so if the business is properly handled we ought to more than break even. We are charging 45 cents a meal at nearly every camp on the Columbia River and I find that we are somewhat behind for the year right now. I think everybody in that position has a great big apology to make, because we are not doing it right at all, and it does seem to me that the loggers could devote a lot of time to that particular subject very profitably.

# SKIDDER SIGNALS

*(Standard Signals for Pacific Coast Fir Skidder Operations)*

- STOP (if engine is running) AHEAD ON SLACK PULLING LINE AND PAY DOWN SLACK ON TONG LINE (if engine is standing still)
- AHEAD ON SKIDDING LINE, HOLDING CARRIAGE STATIONARY ON SKYLINE WITH RECEDING LINE.
- AHEAD WITH CARRIAGE, HOLDING TURN AT PRESENT HEIGHT. In this operation skidding and interlock frictions are both engaged.
- HOLD CARRIAGE AND PICK UP SKIDDING LINE EASY
- SHAKE CARRIAGE TO CLEAR CHOKERS.
- GO BACK WITH CARRIAGE.
- DROP SKYLINE.
- RAISE SKYLINE.
- TIGHTEN ALL LINES (skidding, receding and slackpulling)
- (Followed by several short whistles) SLACK RECEDING LINE
- Several Short Whistles — SLACK SKIDDING LINE.
- (Followed by several short whistles) SLACK SLACKLINE.
- (Followed by one short whistle for each choker to be sent back to woods) given with carriage at or approaching landing.
- (Followed by one short whistle for each 10 feet of tong line to be added) given with carriage at landing.
- Several Short Whistles — (Followed by ) PICK UP SLACK LINE, GIVEN WITH TURN COMING IN.
- AHEAD ON STRAWLINE.
- (Followed by several short whistles) SLACK STRAWLINE.
- AHEAD ON TRANSFER LINE.
- (Followed by several short whistles) SLACK TRANSFER LINE.
- (Followed by one short whistle for each coil wanted) SEND COILS OF STRAWLINE BACK TO THE WOODS ON CARRIAGE
- SIGNAL FOR RIGGER (given at a time when there is no chance of confusing signal with transfer line signal.
- HOOKER AND CREW COME IN TO MACHINE.
- SECOND RIGGER AND CREW COME IN TO MACHINE.

*Courtesy Lidgerwood Manufacturing Company*

# Experiences With Falling and Bucking

PRESIDENT STEWART: We have down for informal discussion the subject "Experiences With Falling and Bucking." Is anybody doing any bushel work?

Mr. Flora: Yes; we are following the bushel system.

President Stewart: How are you doing it, by the square foot or the thousand?

Mr. Flora: We pay the fallers 30 cents a thousand and the buckers 25 cents.

President Stewart: Full scale?

Mr. Flora: Full scale.

President Stewart: Do you scale the full break or the full tree?

Mr. Flora: We scale for the first break on a green tree, and give them 90 feet on a snag.

President Stewart: How about bucking?

### *A Man to Figure the Scale*

Mr. Flora: We pay the buckers 25 cents a thousand. All the difficulty we have had is in getting a scaler who will really scale for what there is in it. He will scale for the faller and guess at it for the bucker. But we have a system now by which we don't let the scalers do any figuring at all. We have a man in the office who figures all the scale.

President Stewart: Do you have any check on this scaler, as to the accuracy or honesty of his work?

Mr. Flora: We have a check scaler now who goes around and checks the other scalers.

President Stewart: What do you find your fallers make per day?

Mr. Flora: They will average 45,000 or 50,000.

President Stewart: And the bucker about the same?

Mr. Flora: About half that much. You see, it takes about two buckers to one faller. We did do it by the day, but we could not get good men. Most of the good fallers were working by the bushel.

President Stewart: Do the men prefer contract or day work?

Mr. Flora: They prefer the bushel work; that is, all the good fallers we have had do. We have a somewhat rough country and some pretty long walks, and when we were falling by the day I don't think we got over six hours' work.

President Stewart: How long do they work now?

Mr. Flora: They stay on the job now, all right. We had friction all the time working by the day.

President Stewart: Did you ever hire them by the square foot?

Mr. Flora: No.

### *Thousand Basis Preferred*

W. J. Nelson: We have done some by the square foot, but we don't like it, because there is so much breakage in the timber. They would throw a tree down and didn't care whether it broke or not—they got so much a square foot for the stump. The stump was what they were interested in. So we switched from the square foot to the thousand basis. That worked well on the fallers, so we tried it out with the buckers. I believe now we are paying 35 cents a thousand for falling, 30 cents a thousand for bucking, 60 cents a thousand for windfalls. We have a scale sheet containing the number of trees up to 100; that is, the fallers mark their trees, numbering them up; they start at one and run up to 100; then they drop back again and commence at one again. The name of each faller is written on the butt of his trees, and your scaler goes out and scales trees by numbers. The windfalls are numbered in the same manner. You can check that up yourself, or your check scaler can go out and check after the scaler. The mill companies in our district together employ a check scaler. He visits each camp regularly and checks the scalers. The scaler you have in the woods doesn't know when this check scaler is coming. The system seems to be working out well. We found after the check scaler went on quite a difference in the scaling, as the scalers didn't want to be accused of giving more scale than was necessary.

President Stewart: What do you do about broken trees? Do you scale to the first break?

Mr. Nelson: We square all logs and cut everything that will make a 32-foot log with 12-inch top. We square all breaks. We pay nothing for dead heads. They have to buck out the dead heads. They have to fall all snags that will make one 40-foot log.

President Stewart: What kind of timber are you in?

Mr. Nelson: Mostly fir. The costs on cutting vary with the size of the timber. You can't cut timber that will average 2000 a tree for the same cost you can cut timber that will average 5000 to the tree. That price on the thousand basis has to be changed according to the size of the timber.

President Stewart: Do your men like the per thousand method as well as they do the square foot method?

### *Allowances for Overcut*

Mr. Nelson: I don't know as there is any difference with the men, but so far as the company is concerned they are better off with the thousand basis than they are with the square foot. As I said before, all the men were interested in was saving the stump, but whenever they break a tree, or smash it all up, your buckers object to that because they want a tree laid out in nice shape. They keep in line better themselves, and they want to save the timber themselves, and it makes a saving on timber to have it bucked by the thousand.

R. W. Vinnedge: I would like to ask if the bucker cuts a 32-foot log how much overcut is allowed?

Mr. Nelson: For trimming we allow from four to six inches. If a bucker goes out in windfalls and bucks a defective log that is not any good, and it is easy for anyone to see that it is not any good, we don't pay him for it; we don't scale it; consequently he uses a little judgment on the quality of timber he is cutting. You have a chance to educate him. And if he does not square off the end of a broken log we don't allow him anything for it; consequently he is interested in squaring it off. We have no trouble along those lines at all.

# Experiences With Caterpillar and Tractor Logging

PRESIDENT STEWART: We will now take up the subject of "Experiences With Caterpillar and Tractor Logging."

E. G. Polleys: We have been using tractors for the past two years, and we have had very satisfactory results. We are doing practically all of our logging with tractors at present and have been for the past two years.

President Stewart: What size tractor or caterpillar do you use?

Mr. Polleys: Ten ton.

President Stewart: Do you go up and down very steep grades with them, or is it in fairly level country?

Mr. Polleys: We use them on 40 to 45 per cent slope.

President Stewart: At all times of the year?

Mr. Polleys: We never use them in the winter time on the snow. We could not use them on the steep slopes in the snow. We use them in the summer when it is not muddy.

President Stewart: How do they work in rocky country; that is, not big rocks, but where the soil is quite rocky?

Mr. Polleys: We haven't had so much experience where it is very rocky. We have had some rock, but no particular difficulty. I have seen chances where it was very rocky and where they got very good results from them.

President Stewart: What is the principal objections? There must be some drawback to logging that way?

Mr. Polleys: You can't depend on keeping in logs all the time; you have to have a surplus ahead. The tractors may break down and you have to take two or three days for repairs occasionally. But we have found that by keeping a surplus ahead we could keep our loaders busy all the time and get along very nicely.

President Stewart: How long does a caterpillar last? How long can you use it continuously?

Mr. Polleys: We haven't had ours long enough to say. We have been running one two years and a half continuously.

President Stewart: What depreciation do you figure on them?

Mr. Polleys: We haven't studied that out very carefully. We pay our repair bills and keep it going, and the results have been a little better than with horses.

President Stewart: You are logging in yellow pine and fir?

Mr. Polleys: Yes.

Donald McFadon: A little over two years ago we found ourselves up against a tract of timber on which there were alternate groups of heavy timber and at times very scattering timber on level, gravelly ground. We found when we put our donkey on the land where the scattering timber was we lost more than we made in the land where the timber was thicker. So we bought a tractor, and the result has been that the tractor has enabled us to log the scattering shows about as favorably as the donkey would log the show where the timber was thick. We estimate the tractor will last about five years.

*Trailing Chute with a Tractor*

It is broken down more or less of the time, but not enough really to make a difference, unless it is the only unit of operation you have. We are using it in conjunction with the railroad operation and donkey operation.

President Stewart: What size tractor is that?

Mr. McFadon: Holt ten-ton.

President Stewart: How far do you haul with it?

Mr. McFadon: Not over 1200 or 1300 feet average, and that is only when we go out on the corner. We log on the average not over 1000 feet.

President Stewart: You say you log cheaper on the scattering timber with the tractor than you do with donkeys in the fairly thick timber?

Mr. McFadon: No; it averages about the same. It allows us to log that kind of tract without the loss of the scattering landings we would have if we tried to log those with donkeys.

E. O. Moore: You asked about the life of a caterpillar. I want to say we had a demonstration at our place last fall. We were skidding 40-foot logs that day with a ten-ton Holt that was seven years old, and is still in good working condition.

President Stewart: How much did you use it during those seven years?

Mr. Moore: We attempt to use it only in summer, when the ground is hard and dry.

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President Stewart: Somebody suggested the subject "Power Hauling on Log Chutes."

Mr. MacGregor: We don't know anything about power hauling on chutes so far, but we are interested in learning something about it, because in our country we have used log chutes on account of not being able to get the track to our timber. We have to bring logs down the chutes sometimes from a mile to three miles. We are trying to devise some scheme for getting away from so many horses on the chutes. We have in mind an endless line that will go around and catch the loads. So far we don't know anything about it. I believe Mr. Bjorge, of the Clyde Iron Works, is studying the matter a little, and I hope to have something better on this subject next year. We expect to try something out during the coming year.

(Moving pictures shown.)

President Stewart: "Surveying, Construction and Operation of Logging Railroads" is a very important subject and problem for many of us, and a constantly growing one. It is the next subject.

# Surveying, Construction and Operation of Logging Railroads

WALTER J. RYAN: There is only one thing which I have done during the past year that might possibly be of interest. That is I have attempted to analyze as closely as possible the different items that ought to make up our costs on ordinary logging spurs in West Coast timber, in the heavy fir stands, and as near as I can get at it on an average we are paying about $10 a station for the falling and bucking. The practice differs between the companies as to where this is charged. In some operations the bull bucker takes care of this and it is charged to the logging costs; in other places it is done by the railroad construction crew and charged up against the railroad; but as near as I can average it from my experience about $10 a station represents this cost. Including the stumps and the grubbing out of the right-of-way, including powder costs and labor costs, it totals to as much as $15 a station in the very heavy fir stands. In addition to that there is a cost for chunking out the logs and the stumps. This is done in many different ways. In a great many cases it is done by hand; in other places it is done by the steam shovel, and in some operations it is done by a separate unit. Gasoline-driven donkeys have been used; in some places steam-driven donkeys are still used for this chunking out. But my estimate of a fair average price would be about $10 a station for chunking out. This leaves the right of way ready for the grading, and of course the grading costs vary all the way from $10 to $100 a station, depending on the locality.

### *Items Entering into the Cost*

Where we are grading by hand it is usually contracted by station to station crews and the finished grade is left for the track; in other cases, where the work is done by power shovels, either steam or internal combustion, the grade is left in more or less rough condition. Where the work is done by a Bagley it is even in a more unsuitable condition for track laying; then this finishing item cost comes on that. That varies of course with the care taken in the rough grading. That is another item which is sometimes overlooked in figuring the total cost of railroad construction. My observation this year has led me to believe the ordinary steam shovel operator ought to leave a cut in shape so it can be finished for about $3 a station.

President Stewart: What is your opinion as to the comparative desirability of station work as against doing it yourself with steam shovels or other modern equipment? I mean on fairly heavy main line work.

Mr. Ryan: Of course the trouble with any general statement of that kind is, it is almost impossible to analyze the problem without knowing the absolute details of the situation. At present the work I am connected with is being done some by general contractors, regular main line railroad contractors, with regular main line equipment which they use on main line work. Other work is being done by team outfits by the yard; other work is being done by hand graders by the yard; in some places they are using steam shovels, in other places using gasoline shovels, and in one instance there is a Bagley being used. As a matter of fact, every one of these systems has a place. Of course, I won't say that in each instance we are using the right system at the right place, but I do believe there is a place for every one of these different outfits; and it is impossible to generalize as to which is best until you know the actual conditions and circumstances.

James W. Girard: There has been so much said on this subject during the last four or five years; it has been covered so thoroughly by papers read before the various congresses, and also thoroughly covered by articles in The Timberman, that I don't feel that I could add much to the information that is already available. Our work at Burns, Ore., which we have done the last year, it is a very simple proposition. From Crane, the end of the present Ontario-Crane branch of the Oregon Short Line, to Burns is a distance of 30 miles. It is 27 miles from Crane to the sawmill site near Burns. In that 27 miles we have two curves, 45 minute curves. It is a flat sagebrush country. There were no problems involved whatever in location. I walked over the country early in the spring—it is a country that they flood with a system of irrigation—and picked out the highest ground. The main thing was to pick out the highest ground, get the straightest line possible and the shortest distance, and miss houses. We picked out the easiest crossing of the river and set up a flag at that point, then went from that point to the mill site, a distance of about 14 miles, got up on the hill back of the mill site where we could set up our transit and locate the flag 14 miles away. We let the right-of-way clearing out by so much per acre. We got that done for $5 per acre. Our yardage averaged about 7000 cubic yards per mile. We first put it up for bids, and owing to the fact that there is a great stretch which required considerable finish work in proportion to the yardage handled the bids were rather high. They ran from 30 to 35 cents per cubic yard. So we decided we would do it with local help. We got out and taught some of the ranchers how to build railroad and we let it all out for not to exceed 20 cents per cubic yard. It cost us about $1375 per mile for 7000 cubic yards, including handcar sidings, rail racks, farm crossings and about five miles of siding. This road was built to Union Pacific standard for branch line, 14-foot roadbed on top, slope one and a half to one. The cuts were 20 feet with three-foot ditch on each side, finished to the nearest twentieth of a foot. We had no difficulty at all when we laid the track this spring. We just laid the track on the surface. We didn't need any lining up at all.

### *Fresnos Used Exclusively*

Prior to the time we started railroad construction we made a study of various kinds of yardage costs, and we knew what a Fresno would do, and this was all Fresno work. We figured in that particular type of country it is the cheapest method of grading and makes the best grade, so we used Fresnos altogether. We didn't do any topographic work on this 30 miles. The highest fill was 16 feet; the deepest cut was four feet. About 90 per cent of the classification was common, a small percentage of intermediate. In classifying material anything that four good strong horses could not plow without shooting we classified as intermediate and paid from 40 to 60 cents per cubic yard, depending upon the difficulty of plowing.

From Burns to the timber, a distance of 50 miles, we pass over considerably rougher territory. The reservoir site is on the river, which made it impossible for us to go up the river. We climb 900 feet in a distance of about 22 miles. The problem involved there was to take a uniform grade at a considerable higher cost of construction, or take an easy grade for a distance of about 20 miles and then make all of our climb in five or six miles; so we set as a standard of location a maximum of 2½ per cent against the empties and a maximum degree of curvature of 10 degrees. We have just completed the location and in one place we have a 10 degree and 30 minute curve. All our curves are compensated to take care of the additional friction due to curvature.

We plan to do the heavy work with some type of shovel, steam, gasoline or gas-electric. We don't know what kind we will get yet. Over the rougher portion of this area we made a topographic map. We first ran out the various draws and found out the best pass. It is very evident, just by looking the country over, that you can eliminate certain routes. When it came down to a survey of several routes it didn't seem to make much difference. After we decided on the route to take we made a preliminary survey and made a topographic map, took the topography as far on each side of the preliminary line as we considered necessary to give us the best possible location. We then made our paper location and went on the ground and made our field location accordingly.

President Stewart: Mr. Girard's remarks certainly illustrate the big difference in railroad construction as between the pine country and the fir. Our company happens to be building through a rather bad country, and I find it is costing us at least $50,000 a mile, perhaps $60,000 for some two or three miles.

### *Rock Work in Coos County*

A. H. Powers: We have just completed the grading of about three and a half miles of the end of what we call the Eden Ridge line. It goes up to an elevation of about 3000 feet. On the three miles we have just graded we have taken out over 300,000 yards of rock, and we have got about two million feet of bridge timbers to put in to connect up before we can get to our Eden Ridge tract. It will certainly cost, by the time it is completed, about $75,000 a mile. We do a great deal of railroad building on trestle work, branch work, and that costs up to $15,000 or $20,000 a mile, according to the heights of the bridges and the material that you have to build your trestles on; whether you have to blast out for your piling or whether you go through deep ravines, or according to the height of your bridges. It will vary anywhere from $10,000 to $25,000 a mile complete on our trestle construction. I think it costs us from $30 to $35 a station to fall the timber, roll it out and roll the logs off of the right-of-way to make it safe to put in a trestle. But we have been in exceptionally rough country. This three miles we have just completed grading has a maximum grade of 6 per cent and 18 degree curvature. It will be a permanent line for probably 40 or 50 years' work, with timber to come over it.

Mr. Meister: How many million feet of timber per mile of track and bridges do you get?

Mr. Powers: We will probably get 30 or 40 million to the mile.

Mr. Meister: We get three.

# Greeting From Society of American Foresters

DEAN WALTER MULFORD: I am glad to have the opportunity to bring one little word of greeting from a sister society, one which is somewhat older than the Pacific Logging Congress; one with which perhaps you have not had very much sympathy, if you have known anything at all about it. I am referring to the Society of American Foresters. Twenty-five years ago a small group of men organized this society. Today it comprises about 1000 members, all of whom are practicing foresters throughout the United States. As I used to go to the early meetings of that society, not the very first ones but those some 15 or 20 years ago, I used to hear antagonism to loggers, to lumbermen; they were destroying the country; they were creatures with whom we should not have anything to do, so to speak. The first session of the Pacific Logging Congress that I attended was in San Francisco nine years ago, and I remember that I came away from that meeting very much discouraged. It was a splendid meeting, but somehow it seemed to me that we who tried to call ourselves foresters and those people who are in the Logging Congress did not seem to have anything in common. Could we ever get together?

Now it happens that this year I am the president of that society. The meeting is held in Washington in December; not because this is a government society, but because it happens to be a good place to meet. It is the close of our first quarter century, and at this meeting we are going to be making plans for the next quarter century. And, Mr. President and gentlemen of the Logging Congress, I am so glad that I have been able to be here. This is so different in its effect on me from that meeting of the Logging Congress nine years ago. I am glad to be able to report to you that the Society of American Foresters has changed, too. I think it also has at least begun to realize that we are all part and parcel of the same thing. We can't have loggers in the future unless we have foresters, and foresters without loggers will be of no account. Let's pull together. There is no reason for our sitting on opposite sides of the table. And throughout this meeting I have been perfectly delighted with the attitude of interest in the possibilities of forestry, or, if you don't believe in it, a sincere disbelief in it, which is perfectly correct, augurs for good; for open-mindedness. Now I propose to take that feeling back to the meeting in the East in December, and I presume to ask the Association of American Foresters to come at least half way. Let us all get together.

President Stewart: Can't you tell us something about what you are doing at the California forest school?

Dean Mulford: Aside from our training of logging engineers and general foresters we are attempting to do some investigative work which I hope is going to be of benefit to the lumber industry; in fact, some of the California lumbermen are good enough to say it has been of use to them. The school is organized on the basis of having a man teach only half of the year, with that man getting out in the brush part of the rest of the time. In that way we hope to have him more than a professor. While in the field he is supposed to carry on certain investigative work.

We have concentrated our attention in the last few years on the redwood regions, and the results in the way of growth studies, how much timber can be produced, and so on, have been so surprising that I am sure it has been one of the big factors whereby Major Mason, of Portland, their consulting engineer, has been able to interest them to such an extent in practicing forestry. We have shown the yield from the second growth; we have made volume tables so that yield could be studied. And through the courtesy of two of the big sawmills

we have put second growth timber through the sawmill, stuff which is despised, which at the present time could not be marketed, but simply to show to the lumbermen and ourselves what kind of stuff opens up out of that second growth, which will be the timber of the future. We are well enough satisfied with it, and they are well enough satisfied, that they say they are going ahead, most of them, with permanent forestry. Over in the pine region we have done this thing as one piece of work. Mr. Bruce, one of the members of the faculty, made some stop watch studies of the relative cost of making logs from large timber and from small, the felling, bucking, and so on; and then the cost of yarding, in order to show by definite experience in three different portions of the Sierras just how much more it costs per thousand board feet in small timber than it does in large timber. Of course you have all known that it costs more, but some of the men wanted to know how much more. That is the type of thing we hope will increase in the future. I hope all of you in your respective states—be it Idaho, Montana, Oregon or Washington, or British Columbia—will sympathize with the desires of all the forest schools to do just this kind of work for you in your respective regions, and if you will give them half a chance I am sure they will do it. The lumbermen down in California have been helping us out wonderfully with this.

# Foremanship Training

**By L. B. Travers, State Supervisor Industrial Education, Olympia, Wash.**

THE lumber industry seems to be subject to most of the ailments of organized industry. In fact, its susceptibility to these ills, in some respects, is far above the general average. This might be due in part to its youth, as it is recognized that immunity to disease comes with maturity, and certainly the lumber industry is still in the pioneer stage in comparison with eastern industries, insofar as they admit of and use the principles of scientific management.

There are many causes which contribute to this condition. One of these is undoubtedly the human element waste in industry. Much time and money has been spent within the past few years in determining both the cost of this human element waste and its causes. Recently a committee of the Federated American Engineering Society on Waste in Industry reported that the human element waste in one industry was $1,908,000,000, in another $1,180,000,000, in still another $964,800,000, etc. Of the 42,000,000 wage earners in industry in the United States, Charles M. Schwab has estimated that each man wastes every day a dollar's worth of time, material or effort. Industry is carrying, then, a load of $12,600,000 annually on this score. Much of this cost is due to carelessness, disloyalty and ignorance.

### *A Question of Prime Importance*

THERE is a grave danger in the consideration of this subject in confusing cause with effect, of mistaking the symptom for the disease itself. Take for example the item of labor turnover. Many efforts have been made to control labor turnover by welfare work, bonus systems, penalties, plant organs, etc., with rather doubtful success. There can be no question but what this subject of labor turnover is of prime importance to the lumber industry. It has been estimated by the U. S. Department of Labor that when you consider the cost of hiring, the spoilage of material by new men, the stoppage due to wear and tear of machinery and equipment, industrial accident, and the cost of training or breaking in new men, the average replacement cost for all industry is $48 per man, while in the logging industry it costs $75 per man to the firm with a payroll of 100 men. The same authority has also estimated that the labor turnover in the logging industry is over 500 per cent a year. An investigation of five selected mills in Washington showed 266 per cent turnover, while four selected mills of Oregon showed 205 per cent. Compare this with 41 per cent labor turnover for all industries. For the sake of illustration, let us assume that a logging operator maintains a payroll of 100 men. With a turnover of 200 per cent and a replacement cost of $75 per man, he is absorbing $15,000 a year in his production costs for labor turnover alone. Labor turnover will never be eliminated entirely. That condition can never be as long as human nature remains as it is. We know there will always be occasions when it will be cheaper to fire and rehire than to keep a man on the job, but if the percentage of turnover could be cut to the national average for all industries a saving of approximately $12,000 a year would result for every operation of 100 men.

### *Causes of Labor Turnover*

TWENTY-FIVE representative industries recently co-operated in a careful inquiry into their man-power problem, with the hope of cutting production costs, increasing employment stability and eliminating waste. After 18 months of investigating they tabulated 104 causes of labor turnover. Of 75 causes of workers quitting the job 39 were found to be within the power of management to control. Of 20 causes of workers being discharged 16 could have been rectified by management.

The United States Department of Labor in their bulletin on Industrial Relations in the West Coast Lumber Industry gives six causes of this labor unrest. The commonest cause, and, according to this report, the most important cause, is given as unsatisfactory working relationships between foremen and men. Let me quote from this report the following: "In most cases men are chosen for positions as foremen on the basis of their knowledge of machinery, or technique, rather than because of their ability to handle men. Accordingly it is common to find that the foreman has little understanding of or sympathy with the feelings and prejudices of his men."

From these facts certain conclusions at least are warranted. It is the foreman who makes the investment in labor pay or fail to pay. It is the foreman whose attitude has the greatest bearing upon the effectiveness of man power. It is the foreman who is the most important factor in labor turnover.

The distribution of the working force has always been a responsibility of the foreman. The manner in which this responsibility is discharged affects the satisfaction and contentment of workmen. This proper placing of workmen not only affects the labor turnover, but also is an important factor in the prevention of accidents. Statistics show that 15 per cent of industrial accidents occur during the first three months of employment. A recent study by the Department of Labor and Industries of the state of Washington, covering 39 months ending December 31, 1923, shows the average compensation cost per day in all industries of that state to be 5.3 cents. Taking this average as 100 per cent, the logging industry is listed third from the highest, with a cost of 215 per cent of the average compensation cost. It is surprising to note that powder manufacturing, which has always been recognized as one of the most hazardous of occupations, falls two places below the logging industry.

### *New Profession Developed*

MANY eminent authorities and research agencies have made exhaustive studies of accidents and their prevention. A new profession, that of safety engineering, has developed within the past few years. The men in this profession have investigated conditions, classified accidents, and designed equipment for the elimination of physical hazards, but still accidents occur, and at an alarming rate. Why is this so? The National Safety Council has said that approximately 90 per cent of all accidents are due to carelessness. Carelessness is a mental condition. Two types of carelessness are recognized: permanent and temporary carelessness. Permanent carelessness is an innate quality and apparently incurable. Temporary carelessness can be controlled. If we are to judge from the fact that the large majority of accidents are due to mental hazards rather than physical hazards, the improving of this condition becomes more a problem of education than of engineering.

Safety work is no longer considered merely a humanitarian consideration. Management now admits it as a good business proposition. But while management may be "sold" on safety work, to the average workman, management is represented by the foreman. Workmen react to the attitude of their foreman. He is the key man in this whole problem. Upon him rests the responsibility for the success of any safety-first program.

The subjects of labor turnover and accident prevention are but two of the many vital problems confronting the lumbering and logging industry for which the foreman has at least a partial responsibility. The president of the International Harvester Co. has stated that, in his opinion, 75 per cent of the difficulties arising in production can be traced to the failures of foremen. We know there are many problems connected with the technical or job knowledge of foremen, but we also know that the foremen need other knowledge equally important. Knowledge of production processes and methods is but the beginning of effective foremanship. It is no longer merely a problem in which a knowledge of tools, equipment and the operation of machines holds control, but one in which the question of human relationships has come to be the outstanding consideration.

Is there any reason why the merchandising methods used in the disposal of a product cannot be utilized in the production of that product? Would any industry keep upon their payroll a salesman who by his manner antagonized customers? Yet we have examples on all sides of the foreman who drives rather than leads his men.

A great deal of the so-called efficiency work in the lumber industry has not been very effective. This, I believe, is partially due to the practice of the investigators looking for production difficulties that have only to do with the physical equipment. Where these conditions can be eliminated by the purchase of new equipment, re-routing of stock, etc., some good has resulted, but when these conditions have been due to human relationships such as faulty orders, poor planning, carelessness, etc., the field is practically untouched. Modern psychology teaches that the way to cure an evil is to develop the good. In other words, emphasize the good and the bad will take care of itself.

### *Importance of Man Power*

I MAY be guilty of emphasizing facts that are of common knowledge, but a recognition of the magnitude of these problems is necessary before any suggested solution might be considered. Production is, and quite logically always will be, the one object of industrial organization—maximum production at minimum cost; but to attain this result industry has found that man power is just as important as machine power, and often more so. This being the case, it follows naturally that the modern and more efficient methods of scientific management have in more ways than one affected the foreman.

It would seem from this discussion that the foremen would be the most carefully selected and trained men in the organization. This is not so, however. They have gained their promotion to the rank of foremen in most cases because they were good workmen. But where their job was to do work, it has now become one of directing and planning the work of other people. This work must be planned on established principles of modern management methods. They must know definitely the results they could and should achieve. They must understand the abilities and possibilities of their men if they are to direct them wisely. They must know something of job analysis, leadership, co-operation, labor turnover, accident prevention, etc. To maintain an even flow of work, to prevent waste and spoilage, to prevent overlapping and gapping responsibilities, to overcome and prevent expensive delays, and many other factors of economical and efficient production problems calls for two distinct kinds of ability—first, the ability to plan, and second, the ability to execute.

### *Foremen Must Possess Leadership*

HOW have modern foremen developed these abilities? By the trial and error method, by what is known as "absorption," by the "pick-up" method, and who will dare say that this is not an expensive process. It has been said that foremen, like artists, are born, not made. Is that opinion surprising when you consider the elimination test they have survived. They would have to be born with leadership qualities, for certainly few agencies have ever made it their business to develop them.

When Congress passed the vocational education act it definitely placed the responsibility for serving the educational needs of industry and society. Recognizing this obligation, the federal board for vocational education, in co-operation with the state boards for vocational education, investigated methods of training foremen. From the standpoint of organization, however, a considerable variety of courses has been developed, practically all of which may be classified under the three following types or combination of these types.

The disconnected lecture plan consists of a series of lectures delivered by presumably qualified individuals. This series of lectures does not, however, constitute a definite progressive program. The usual basis upon which the various lecturers are selected is that they are experts in some particular field. For example, the first lecturer may be a cost accountant, the second an efficiency expert, the third an assistant superintendent, the fourth a general manager, the fifth a production expert, the sixth an auditor,

and so on. While each lecture in itself may deal with some subject more or less connected with the foreman's job, it is to all intents and purposes an independent unit, and the series of lectures taken as a whole does not constitute what would be termed a co-ordinated progressive program.

The co-ordinated lecture plan also consists of a series of lectures, but so arranged that the series as a whole forms a co-ordinated progressive program. The entire series of lectures is often, though not necessarily, given by some one individual, and the program may be made up with special regard to the conditions prevailing in the particular plant in which the foremen are employed. In this case, the lecturers, if more than one are employed, would be selected with regard to a definitely co-ordinated progressive program. Under the disconnected lecture plan the question of who can be secured to deliver the lectures practically determines the subjects, while under the co-ordinated lecture plan the subject determines the selection of the lecturer.

### *How Conference Plan Works*

THE conference plan is characterized by the entire absence of use of lectures, and in this respect it substitutes for that method the use of the conference as commonly carried on in industrial plants. A definite subject for discussion is selected for each conference, and the series of conference subjects constitute a co-ordinated and progressive program. Practically every foremanship course that has been developed up to the present time may be classified as one of the three types given above, or as a combination of these types.

In general it may be stated that where the aim of the training course is to include supervision and management, the tendency has been, up to the present time, to utilize the lecture method in preference to the conference method. The unsatisfactory results of the lecture method, however have recently led to a more general use of the conference plan.

The chief feature of the latter method lies in the fact that the men soon realize that the conference leader is not there to tell them how to handle their jobs. Cases are taken from the organization whenever possible, and discussed by the group. Advantages and disadvantages of methods of procedure are brought out in these discussions, and when a solution is arrived at it represents the work of the group and they feel a just pride in it. Theory as merely theory is never discussed except as it applies to the case under consideration.

An amusing incident that occurred during one of these foremanship training conferences will give you some idea of the attitude of foremen toward educational work of this kind. Arrangements had been made with the management of a certain firm in the state of Washington to hold a series of daily meetings over a period of two weeks. A short, very authoritative notice was sent to each foreman in the organization, notifying him to arrange his work in such a way that he could be present at all meetings. The foremen had about ten days' time to discuss this "school" as they called it before the first meeting was called. Some of them disclosed a feeling of resentment and suspicion toward the management for inferring, at least that they did not know their jobs. One man in particular who had been with the firm many years bragged openly that he would not attend. "If the management don't like the way I handle my job they can can someone else to do it," was his statement.

### *Getting the Men to Talk*

AT the first few sessions of this conference it was noticeable that the men were not "opening up" and joining into the discussions as they should, but after the third day, when they became accustomed to the method and had less distrust of the conference leader, they entered into the discussion with apparent enjoyment. In the meantime, of course, they had been talking the matter over during working hours and at noon times in the plant. They succeeded in arousing the curiosity of our absent friend, who finally weakened to the extent of presenting himself the first day of the second week, to see what it was all about. He arrived with a very apparent "show me" expression on his face. No attempt was made to draw him into the discussion, but gradually it became noticeable that he was forgetting his attitude and listening with interest to the arguments around him. Near the end of the first hour a case came up that had to do with handling men. This case illustrated a common infraction of a company rule by a workman. One foreman stated that he thought the workman ought to be fired at once. Our friend stepped into the breach with a divergent opinion and was soon involved. Suddenly, reminded of his change of front by the amusement of some members of the group, he became silent. A short time later the same type of incident occurred again, but this time he couldn't be silenced. At the close of the conference he came to the conference leader and apologized for his attitude, and expressed sorrow at missing half the meetings.

The Washington state board for vocational education has been serving the lumber industry by training foremen for approximately the last three years. Beginning with a conference at the plant of the Bloedel Donovan Lumber Mills at Bellingham in July, 1920, we later served the Weyerhaeuser Timber Co., of Everett; the Stimson Lumber Co., of Seattle; The Wheeler, Osgood Company, of Tacoma; the National Lumber & Manufacturing Co., of Hoquiam, and the Hedlund Box & Lumber Co., of Spokane. These experiences have proven to us that there is not only a real need, but a desire for this service. If we can estimate the success of our efforts by the requests for service that have been made, we have every reason to believe that this training has to some extent been effective.

So far only one foremanship training conference has been conducted in the logging industry. We are indebted to Tom Murray, of West Fork Logging Co., for his kindness and courtesy in opening his camp at Seabrook, Wash., for an experiment of this kind. To draw any definite conclusions from such a limited experience would be dangerous. However, we have had every reason to be encouraged by this beginning. We are convinced from our experience in other industries that there is a well-determined need for work akin to this in the logging industry. A paternalistic system seems to exist. Responsibilities are neither delegated to nor assumed by the non-commissioned men in this industry. The weaknesses of that condition do not need to be called to your attention. It is like comparing a team of bush leaguers to the Washington Senators. Team work does it.

### *Habits Are Slow to Change*

IN conclusion let me emphasize this point: If we are to judge from the interest and response that foremen give during the sessions of a training course, we could assume that when they agree upon a proper course to pursue they would immediately put it into effect. Such is not the case. Mature men do not change the habits of long years' standing during a two weeks' course. Permanent good can only come from a well-selected follow-up program, which by constant repetition impresses upon their minds the things they themselves have decided upon as the proper procedure.

The Washington state department of vocational education hopes to be of service and assistance to the logging and lumber industries of that state in this work. Insofar as our limited staff will enable us, we expect to continue to conduct courses of this kind. To any of you who are interested, descriptive matter and copies of foremanship training conferences will be mailed upon request to our office at Olympia, Wash.

## Discussion

President Stewart: When Mr. Travers finished his very good paper on "Foremanship Training," which, by the way, is rather a new subject to most of us, Tom Murray was out of the room. What do you think of foremanship training?

Mr. Murray: Early last year George Long, of the Weyerhaeuser Timber Co., had Mr. Travers call on me with the idea of seeing what might be worked out in having foremen trained in the woods. As I understand it, there has been a considerable amount done already in some of the big manufacturing plants and in some of the sawmills, with a great deal of success. Mr. Travers and another man came over to our camp on Hoods Canal, and spent two weeks there, realizing, of course, that it was an experiment to see what could be done in the way of organizing all of the head men of an ordinary logging camp in some kind of a unit company organization from the standpoint of an educational proposition, and a proposition of foreman advancement, interest to the company, and all that sort of thing. I want to say we thought it was quite successful, even if it did not do any more than prove to us that there was a field there that could be developed.

The loggers, of course, are somewhat different than the average type of workers, because they are a little shy of talking; but we called a dozen or so men together, such as woods foremen, superintendent, hook tenders, and even our rigging men because they had charge of the four chokermen under them, and the donkey engineer because he had a fireman under him, the section foreman, boom foreman and head brakeman; and the meetings were held every night for five days a week for two weeks. After about the fourth or fifth meeting the men commenced to talk and brought up all kinds of suggestions, and there were lots of arguments just like those that go on at these meetings. The whole thing really looked to me like it was a very fine thing and would ultimately develop into something which is very much worth while. I want to say I think Mr. Travers certainly is a wonder when it comes to getting things out of men. He started in by telling the loggers he didn't know anything about the logging business, not one single thing; but before he got through he had an awful lot written down on the blackboard about very pertinent points about the industry that a pretty good logger would have a hard time getting out of a buch of men. Mr. Donovan has had some experience, as I understand it, and I would like very much to have Mr. Donovan say something.

### *Gatherings Prove Successful*

MR. DONOVAN: The teaching of foremen in Bellingham in June and July of 1920 was not in my department. I am supposed to look out for the woods in our company, and my partner looks after the mills. This was a training of mill foremen. You remember when we were getting over the war we had quite a crop of new thoughts, some of them good and some of them bad. This was one of the new ones, with the idea not only of getting the employer closer in touch with his foreman but the foreman in closer touch with his men. The plan was to bring in a man from the outside who was capable of doing a lot of independent thinking and try to bring the foreman to a realization of the way the men look at some of these things, and possibly the way that the owners look on some of the foremen. When the thing was first suggested by the management to the foremen, and even to the superintendent, the thought was not very popular. Most of them thought, just as has been suggested by Mr. Travers in his paper, that some bright college man could not tell them very much about sawing lumber, and, what is more, they didn't want him to. Professor Jensen came up from the university, met 15 or 20 of our foremen, talked to them like a gentleman, and got them sufficiently interested so we didn't actually have to hitch a rope onto them to haul them into a room. We had these conferences I think twice a week for something like two months, and after the first two or three conferences the men not only did not have to be hauled in but they were anxious for Mr. Jensen to talk to them and confer with them, draw them out, raise any questions; and when he got through and gave each one of those men who had attended a certain number of hours a certificate to that effect, the men quietly turned around and prepared a nice little present which they gave to Mr. Jensen, with an address thanking him and congratulating him on the success of the school. I want to endorse all that has been said by Mr. Travers on the importance of this particular kind of training. We think it did our men a lot of good, and hope to try it again.

Lewis T. Kniskern: We had a course by Mr. Travers given at our mill at Hoquiam, and I can't add much to what has already been said except to call attention to two particular things that struck me very favorably in connection with the course. The first was that Mr. Travers placed in the minds of our foremen very definitely a sense of responsibility, which many of them had never had before. In the second place, he gave me, as well as others at the heads of departments in charge over the foremen, a good many new ideas about how to get the best out of those men.

## Logging in the Black Hills

PRESIDENT STEWART: We had with us in Spokane last year a man from the Homestake Mining Co., of Nemo, S. D., and I think it is a compliment to the Logging Congress that he should come not only as far as Spokane, but a second time to Portland. We would like to hear from W. D. Beardshear, of the Homestake Mining Co.

W. D. Beardshear: I have been asked to tell you a little about South Dakota. Really I think I should. When I attended your Congress in Spokane last fall somebody over there called me the sagebrush logger. South Dakota timber is all located within the confines of the Black Hills, which are merely a bunch of mountains shoved right up out of the middle plain of the western United States. Their maximum elevation is about 7300 feet; the average elevation is about 5000 feet. The timber there is western yellow pine. We have nothing else. When the forest reserves were first created by the United States the first sale of timber they made to a corporation or an individual was made in the Black Hills reserve. This sale was made by the government to the company I am with, the Homestake Mining Co.

Just to give you an idea of some of the timber we have, along in 1902, 1903 and 1904, when the timber beetle got into our timber, about two billion five hundred million feet of our pine was killed in those three years. When lumbering first began there, along about 1876, there was probably 15 to 17 billion feet of timber in this district. Today there is probably less than half of that, or about seven or eight billion feet. There are about 40 or 45 small mills located within the area of the Black Hills. They are mostly small mills. The largest operation is the Warrenton Land & Lumber Co., located at Rapid City, with a cutting capacity of about

100,000 feet a day. We have that sawing capacity, but we very seldom use it. All that I have to do with the lumber industry is to furnish the Homestake mines with the timber they use. At the present time we are selling little to the commercial trade.

To give you an idea of the size of some of our trees, we have produced timber that runs about 20x24. We experience no difficulty in getting timber of that size; neither do we have any difficulty in getting timber such as 12x12—40 feet long.

Our logging methods are not applicable to your conditions here, neither are your methods applicable over there. We have two different operations, one on the west side of the Black Hills, in Wyoming, the other on the east side of the Black Hills. These two logging operations are entirely different. On the west side we depend entirely upon sleighing in snow; on the east side we do tractor and rail logging with horse skidding.

After coming to the Congress last fall I went home and tried out one of these tow chutes, but it did not work out very well. It worked out all right so far as the logging end is concerned, but we have to follow up with the cordwood operation. We have to produce a great deal of cordwood for burning lime, etc. It takes 150 cars of lime a year to run our mine, which requires a great deal of cordwood. We could handle logs on the tow chutes but we could not handle the cordwood; consequently the chute was not an entire success.

In our cutting methods we try to get everything done by the thousand. We have to pay a great deal more than you loggers do over here. We ordinarily pay $2 a thousand. That includes falling, bucking and piling the brush. We have to pile all our brush and burn it when the first snow in the fall comes on, or the last thing in the spring. I think Mr. MacGregor's figures are just about the same as it costs us. If the cutters do not pile their brush we make a deduction of 50 cents a thousand; then we follow that up with a brush piling crew, and in certain cases it has cost us as much as 17 cents a thousand to burn the brush after it is piled.

We do tractor logging on the east side. We use the Holt machines, of which we use two 10-ton and one 5-ton. The upkeep is heavy on these tractors, but we are rather fortunately situated in that we have a well-appointed machine shop and foundry, and about once every six or eight months we put a machine in the shop, bore out those parts that are worn off center, bush them up, give them a thorough and complete overhauling. Then we take them out and we run them again for six or eight months.

On the west side operation we depend entirely upon the horse and sleigh haul, and it is a cheap method of hauling. In connection with our method of cutting on the west side, we find that our timber is being depleted so rapidly that we are practicing forestry, or trying to do so. Our western operation has good logging ground, where little road building is necessary. You can drive into the woods almost anywhere with a sleigh, pick up your load and take it in. Consequently we are going over our land cutting out the older stuff, particularly that infected with bugs or the timber beetle. It is merely a cleanup operation. After this cycle of cutting we expect to follow up and cut out the matured and over-matured timber, and then again repeat the operation. It will take probably 12 to 15 years to go over the area the first time—about 25 years for the second operation, and about the same length of time for the third period.

There is no question but that we can produce a great deal more timber per acre by cutting out and thinning out the old stuff. It has been clearly demonstrated over in our country in the virgin stand that we will grow about 200 board feet per acre per year. With the selective cutting method we can grow about 400 board feet per acre per year. I just bring that into this talk merely to show you that over in our country we do have to practice forestry, because our timber is becoming scarce. On this basis we figure we have timber land enough to grow all the timber we will use indefinitely for the mine use.

It hits a fellow pretty hard to come from a country like that and see the amount of timber you leave on the ground. You leave more in your operations here than we have to start with. That is not a criticism' it is merely a fact, probably governed by such things as were brought out by Mr. Donovan, such as tax problems, logging methods, and high tension plants; but I have wondered since attending these two Congresses if in 25 or 30 years, when our boys have grown up and probably gone into the lumber game, if they would look back and say, "Well, Dad, if you fellows had been a little more careful maybe there would have been a little more left for us to work with."

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President Stewart: Through some misunderstanding, Steven N. Wyckoff's talk on "White Pine Blister Rust Control" was placed on the wrong day of the program, and consequently we didn't have time to permit of the full showing of his very interesting film and hear the talk which he expected to give on it. Mr. Wyckoff's statement will be incorporated in the official proceedings.

We have this morning another interesting subject. Mr. Girard, from Burns, Ore., stated that one of his main purposes of coming here was to hear the discussions on steam, electric and gasoline shovels. He intends to buy one, but he has not quite made up his mind as to what kind of a shovel he will buy. Is Mr. Nelson, of the Eastern Railway & Lumber Co., here? I understand Mr. Nelson is using a Diesel shovel.

# Steam Shovels vs. Gas and Electric Shovels

W. J. NELSON: We were contemplating buying a new shovel, and I went to look at all the gas shovels and steam shovels. I didn't understand the Diesel shovel at that time, but finally I went to look at one and it appealed to me so greatly that I finally made the company a proposition that I would buy the shovel and do the road work at a certain price and they took me up on the proposition. Since the third day of July I have completed about three miles of road. I buy all the fuel from the Standard Oil Co.; I run the shovel two shifts and part of the time three shifts. My total oil bill, including fuel and waste, has not exceeded $125 a month. It operates with the greatest of ease; it has plenty of power; and I feel very much pleased with it.

B. H. McGillicuddy: I would like to ask Mr. Nelson how he is working his crowding engine.

Mr. Nelson: There is a drum on the central part of the boom which operates the gearing on the dipper arm. The hoist line runs from the drum through the top of the boom down to this drum on the central part of the boom, and the second drum line also runs through the top of the boom and down to the center of the drum on the central part of the boom on the reverse side of the drum. While your dipper is hoisting, the tail hold, as all loggers understand, fastens to this drum in the center part of the boom, which acts as a thrust. In other words, the tail hold on the hoist line works the drum and forces the dipper out. The second drum and line is hooked on the reverse side of the drum, and when you hook that in, it pulls the dipper in. You have as good a dipper thrust on that machine as you have on any other machine, so far as shoving it into hard material is concerned.

Mr. McGillicuddy: How do you shake the bucket?

Mr. Nelson: You can't shake it in the same manner that you do the steam, but I believe you shake it in a way that gets the same results as with the steam machine with less rack and wear on the machine.

President Stewart: How does the total weight of your shovel compare with the steam shovel?

Mr. Nelson: It is about the same.

President Stewart: What size dipper do you have?

Mr. Nelson: Three-quarter yard. They build different sizes, but I have the three-quarter yard.

President Stewart: What length of boom or dipper arm do you have?

Mr. Nelson: The boom is in a little different form. The line hooked up on it makes a little difference in the hoist of the dipper, but the company that builds them has taken care of that by putting on a longer boom. The boom has an elbow in it and the bucket is hoisted on a block, and the block on your bucket goes up in the bight of the line. I have handled 12-foot cuts and a few eight and nine-foot cuts. There is no machine that will go through a 12-foot cut without casting twice, and give you a good roadbed. I think I can handle dirt in railroad work with this machine as easily as anything that is built in the steam line.

President Stewart: You have used steam shovels?

Mr. Nelson: I have.

President Stewart: Is there any disadvantage that you know of at all in the Diesel shovel as compared with the steam shovel?

Mr. Nelson: I prefer the Diesel shovel.

President Stewart: But I am asking if there is any particular disadvantage in the Diesel engine which you don't have in the steam? Does it work as quickly? Does it work as fast as a steam shovel?

Mr. Nelson: I don't see any disadvantage in the Diesel machine over the steam.

President Stewart: Have you used a gasoline-electric shovel?

Mr. Nelson: I haven't used them. I have seen them operate.

President Stewart: The gasoline-electric shovel is not, I think, as fast a shovel as a steam shovel. Is the Diesel shovel as fast as the steam?

Mr. Nelson: The Diesel shovel may appear a little slow to you, but when you take into consideration the continuous operation of the machine it usually doesn't spell anything.

President Stewart: How large a crew do you use?

### *One Man Operates Machine*

Mr. Nelson: One man, the operator. My son runs the shovel in the day time and I run it at night, and it is working 24 hours a day when we are on the job. It is not doing that now, because I have come down here to see if I could not get a little more dirt to move.

B. H. McGillicuddy. The Mason County Logging Co. is operating two steam shovels and one gas-electric. The company has no Diesel but experience has taught us that the most flexible shovel is the steam shovel. It is quicker and more active. But the gas-electric, which we have been running most of this year on a double shift although not as flexible and as fast, does the work. It takes only two men. We can't shake the dipper on it. We tried one of these battering rams on the left of the dipper door, but that is not very successful. We had trouble with the cable running out to the dipper, following the dipper. You have to have that cable attachment all the time to feed the power to the ram; and although the gas-electric is much slower, its operation cost has been less than the steam shovel. I think there is a place for all of them.

Mr. Erwin, who is operating in hemlock, tells me that the way he handles the fuel proposition is to put on an extension firebox. That is what we are up against with the steam shovel. We are in hemlock and we can't keep steam, making half a station a day. Of course with any shovel we would have to get the fuel there, whether it was gas-electric, Diesel or steam. I would like to know how some of you operators get fuel to the machines, by horse, tractor, or what, and what success they have. I think that is a vital problem, especially when your machine gets out a couple of miles from your rail head.

President Stewart: Mr. Erwin has answered your question as to how to use hemlock for fuel. If you get an extended firebox, or even a large firebox, you will have no difficulty in burning hemlock for fuel. How much do you use per day, Mr. Nelson?

Mr. Nelson: During the dry months, while the ground was dry, I had a Ford runabout and I would throw a barrel of oil on behind and run it up to the machine. After the weather got bad I got a horse and a little sled, and once in a while when I am down in camp I throw a barrel of oil on it and take it up. The Diesel does not require a great deal of fuel, when you consider the price I gave you for the cost of fuel for a month. You don't have to haul very many barrels. We fill the tank about once in 24 hours.

President Stewart: How large a tank, Mr. Nelson?

Mr. Nelson: It is a 40-gallon tank, and I would say the machine burns in eight hours' continuous running not to exceed 12 gallons.

E. C. MacGregor: Mr. Nelson, what do you do when you have a stump or something to hook onto?

Mr. Nelson: I don't allow stumps to remain within reach of the shovel, as long as I have powder. But if you should get up against a stump you can roll it out with the bucket. It is not necessary to have a man there to hook it on. There is only one way to shoot a stump, and that is to shoot it as near off the section as you can get it. I don't care whether it is steam or Diesel or gas, you can't afford to buy a shovel to log and roll stumps with. You have powder to handle the stumps, donkeys to log with, and the shovel is to handle the dirt. I have a Fresno tractor mounted on a sled, with the Skagit Iron Works drums on it, and a donkey to remove logs. I don't cover up any merchantable timber; I haul that to one side; and the small stuff that goes out with a shovelful of dirt I don't bother with.

President Stewart: You clear the right-of-way, also, in this road you are building?

Mr. Nelson: I fall all the timber and clear the right-of-way.

President Stewart: Approximately what does it cost to build a railroad per yard with that kind of machine?

Mr. Nelson: The cost is below that of the steam machine. When you come to costs, it is just a matter of what you are figuring; it is just a matter of the country in which you are building the road. One man might get up here and tell you that he has built a mile of road for $2000, which he may have done; another man would say that he would built it for $10,000. We have an easy country to build road in at the

present time, and it is costing about $4000 a mile.

W. M. Leuthold: Do you think that the life of this machine is equal to the life of the steam machine?

Mr. Nelson: The life of any machine depends on the care taken of it; and I feel that I can preserve the life of this machine to compete with that of any steam machine.

E. O. Moore: When we looked around at the different gas-electric, straight gas and Diesel shovels we decided that we would like to purchase the Diesel type but thought it too expensive for our use, as we have only a small amount of heavy railroad grading in our work east of the mountains; so we decided to buy a straight gas machine. Feeling that the gas shovel is still in the experimental stage, and that there will be great improvements on them in the next five years, was another reason why we did not want to spend a great deal of money on this piece of equipment. In setting up the depreciation rate we estimated that we should charge off this piece of machinery in 1000 working days, so our rate of depreciation is $10 per day.

### *Gas Shovel Costs*

In the figures which I have prepared we have allowed very liberal depreciation, and you will notice in the fourth year we have provided for the purchase of an entirely new crawler tread and gear; out total daily cost figures, $37.75, including the operator and the one helper, who constitute the entire crew. These daily costs are as follows:

| | |
|---|---|
| Cost of gas shovel | $10,000 |
| Depreciation of gas shovel, per day | $10.00 |
| (These figures compiled on a basis of 200 working days per year, for five years, the probable life of shovel.) | |
| Interest on investment, per day | 1.50 |
| (Interest figured using 6 per cent as a fair basis, but deducting proportional depreciation for length of life of shovel, which makes 3 per cent a fair proportional rate of interest to cover whole cost of interest.) | |
| Taxes, per day | .15 |
| Insurance, per day | .10 |
| Gasoline, maximum daily consumption 25 gallons, at 22 cents per gallon | 5.50 |
| Oil, per day, 2 quarts, at 25 cents per qt. | .50 |
| Repairs: | |
| 1st year, $3 per day | $ 600 |
| 2nd year, $4 per day | 800 |
| 3rd year, $5 per day | 1000 |
| 4th year (new tread and gear), $20 per day | 4000 |
| 5th year, $7.50 per day | 1500 |
| Total, 1000 working days | $7900 |
| Or repairs, per day, approximately | 8.00 |
| Operator, wages, per day | 7.00 |
| Helper, wages, per day | 5.00 |
| Total cost per day of shovel operation | $37.75 |

In an ordinary operating chance we figure that the shovel can easily move 400 yards per day on an average. This figures a cost of approximately 9½ cents per yard. The first 91 days our shovel operated we went through 120 stations of very hard grading, and the total cost was $32.63 per station.

The character of the soil in these 120 stations was as follows:

Solid rock, 4 per cent; good dirt, 30 per cent; slide rock and dirt, 30 per cent; hard clay and boulders (requiring blasting), 20 per cent; average gravel and dirt, 16 per cent; deepest cut, 18 feet; highest fill, 6 feet; maximum curvature, 12 degrees; maximum grade, compensated, 4 per cent.

President Stewart: We have an Industrial combined crane and shovel, a 20-ton machine; two Osgood steam shovels, and a Marion gasoline-electric. The Industrial combined crane and shovel is the largest of any of them, with one and one-quarter-yard dipper, and we have found, as Mr. McGillicuddy has stated, that they all have their place. The Industrial combined shovel and crane does excellent work and has this advantage: When it gets through, the grade is absolutely finished.

Mr. Leuthold: What do you do in soft earth? Does it ever get stuck?

### *No Trouble in Wet Weather*

President Stewart: No. We have track sections built up for it of rails and ties. It works well even in muddy and wet weather. Nowadays with the steam shovel we haven't the trouble with mud that we used to have when we used scrapers and hand work almost exclusively. You can walk up the grade most any time now, even in the winter time.

Mr. McGillicuddy: We are not through with Mr. Nelson, Mr. President. I want to find out who dresses up the grade?

Mr. Nelson: The operator does a pretty good job to commence with, and after the shovel passes over I put a man behind to dress up the grade. The cost of that is around $1 a station.

Mr. McGillicuddy: You mean a man will dress up four stations in a day?

Mr. Nelson: Yes, sir.

Mr. McGillicuddy: Well, we don't get that kind of men. How much of a crew do you use on that Fresno tractor?

Mr. Nelson: Part of the time I have three men and part of the time two. The station work varies a good deal. We run into light and heavy places. So far as the average cost of the station work is concerned on clearing and chunking out, I could not give you a figure on that.

Mr. McGillicuddy: Say $20 or $25?

Mr. Nelson: No, it won't cost that much. I have done it cheaper than that. The heaviest station has not cost me over $20.

Mr. McGillicuddy: What kind of country is this work done in?

Mr. Nelson: It is clay ground, but it is good country, easy road building and good digging.

### *Dirt Handling Costs*

President Stewart: The Gales Creek Logging Co., of Glenwood, Ore., has a Marion gasoline-electric machine, with a three-quarter-yard dipper. They have some figures on yardage costs. I think we will have to take yardage figures with a grain of salt. Generally you think you are getting cheap railroad when you look at the yardage cost of material handled by the shovel, but when you pay the total bill of your railroad you often find that you have pretty expensive railroad. But these people claim in one cut of 3460 yards, with a 22-foot cut at the highest point, they handled that material in eight days at a total cost of 7 cents per yard; used 26 gallons of gas and one gallon of oil per day, making four trips through this 24-foot cut in order to get it down to grade.

Mr. Nelson: Is that labor and material only?

President Stewart: It is labor only. The 16 feet is the deepest cut that they can make, just making one run through the cut.

Mr. McGillicuddy: They won't go through 16 feet. We have to double cast 12 feet with a long boom gas-electric.

President Stewart: You haven't got those stretched out like the Gales Creek people have.

Mr. McGillicuddy: Well, some people can probably stretch them; we can't.

L. H. Thompson: One important question Mr. Nelson brought up was the matter of clearing right-of-way. It is a question whether or not you should put a donkey ahead of the shovel to clear the right-of-way. Our experience this year has been that it actually costs more money to put a donkey ahead and chunk out the right-of-way than it does to run the shovel through and make the grade. Where you have a steam shovel with power enough you are better off to blow the stumps, cut them up and make half the speed and do it all in one operation with the shovel.

On 16,000 yards of dirt in heavy work one of our shovels did the chunking and on part of it we had the chunker ahead chearing the right-of-way. In all of it we figured the cost of falling, bucking, clearing the right-of-way and powder, and on the 16,000 yards it figured 28 cents a yard for the finished job.

President Stewart: Did you allow for depreciation on the shovel in that?

Mr. Thompson: We did.

President Stewart: How much?

Mr. Thompson: Four dollars a day, I think. Four hundred dollars a year would be the depreciation. Clearing of right-of-way, to my notion, is a big problem, and if you can possibly make your shovel do it it seems to me it is the logical thing to do.

President Stewart: This work you speak of was done with a three-quarter-yard steam shovel?

Mr. Thompson: Yes, sir.

### *Favors Chunking with Shovel*

Mr. Forsberg: In my work with the Bridal Veil Timber Co. I have found it pays to do the chunking out with the shovel. I think you can save about $10 a station in that way. Chunking with a donkey will cost anywhere from $8 to $25 a station. That is the best a fellow can do if he uses a donkey, and we find that it seldom costs more than about $10 per station when we chunk out with a shovel.

Walter J. Ryan: In connection with this chunking out, I don't believe you can save $10 a station over Mr. Nelson's price, because from the experience I have had with these contractors, where they use Fresnos, it costs them less than $10 a station to do this chunking out. For instance, on one piece of work I have been quite intimately connected with, the contractor is doing the work of falling, bucking, shooting stumps and chunking out. He uses a Fresno outfit, and with a crew of three men he makes better than an average of four stations a day, chunking out, piling out stumps and logs in heavy fir timber; so he is doing that at an actual cost to him of less than $10 a station. Where it can be done at that price I believe it is cheaper than doing it with a shovel.

I am perfectly convinced that possibly it may not cost you any more in dollars and cents to do it with a shovel, but the wear and the tear on the shovel and the fact that you are doing that work with a piece of equipment that represents an investment of something like $1500 or $2000 instead of with a piece of equipment that represents an investment around $15,000 is in my mind the difference.

### *Chunking Costs a Variable Item*

Mr. Thompson: My experience has been that, unless we do actually keep track of it, we don't know what it costs to chunk. A chunking crew runs into money, about $40 or $50 a day. You turn them loose on a piece of right-of-way and how far do you go in 30 days? Do you chunk a half a mile in 30 days with a donkey? We hear about these costs of $10 a station and $20 a station, but I would like to hear somebody who is using a donkey and who has some low figures made up tell us how they do it. I have never been able to turn a donkey loose in a half a mile in 30 days, and in doing that it is costing nearly $40 or $45 a station for chunking alone.

President Stewart: You are thinking of the lower Columbia River country, where the fir is very large, with lots of hemlock, windfalls and brush?

Mr. Thompson: Yes.

Walter J. Ryan: I have no argument at all with the gentleman who says he can't chunk out with a steam donkey; I am fully convinced that is true; but I do believe in these light units, like the one Mr. Nelson spoke about. In another operation they are using a caterpillar tractor and chunk out at a cost closely comparable to the gasoline chunking out donkey. In either case where you can use a light portable machine, which requires but little fuel and no water, I believe it can be done more economically than with a shovel.

President Stewart: We will now hear from Dean Geo. W. Peavy, of the Oregon Agricultural College, Corvallis, Ore., as to what the various forestry schools are doing.

*Steam shovel with crawler tractor operating in the Douglas fir region*

# How the Logging Congress Can Assist the Forest Schools

By G. W. Peavy, Dean School of Forestry, Oregon Agricultural College, Corvallis, Ore.

IT must be evident to anyone who has followed the discussions at the meetings of the Pacific Logging Congress for the past fifteen years that the logging industry as a whole has some highly technical operations to perform. It has been made clear to all of us that logging railroads, which are built for long periods of service, present all the problems of commercial main line construction, intensified by the rough country through which the roads must run. Discussions of high bridges, of rock work, cuts and tunnels which entail costs great enough to justify the employment of highly trained men have been presented on the floor of the Congress. The high lead vs. ground logging; oil vs. wood for logging engines; electric vs. steam donkey engines, all of them distinctly engineering propositions, have been discussed time and again. That transportation is the key to the logging situation and that timber transportation is distinctly an engineering problem has been pretty well established in the minds of all members of the Congress. We all know that as the margin of standing timber recedes from main transportation lines, transportation costs, translated into terms of costs per thousand feet of logs delivered, are the everlasting nightmare of the woods boss and the operator.

So well have all those things been recognized by the Logging Congress that a few years ago it formally requested the various colleges and universities of the West to provide courses in logging engineering. The educational institutions responded. In Montana, Idaho, Washington, Oregon, California and British Columbia colleges and universities grant degrees in logging engineering. The subject matter in the courses in logging engineering was agreed to in conference between practical operators and the forest school faculties. Young men have been graduated from these courses and are now being tried out in the woods. Some have made a decided success in their work. From the time of the establishment of the courses in logging engineering in the colleges, the Congress has evinced but little active interest in the forest schools or the status of the work. Technically those departments of logging engineering are the offspring of the Congress. It is my feeling that it would be well for the parent to show a little livelier interest in its progeny.

### *Advisory Committee Suggested*

Here are the ways in which, in my judgment, the Logging Congress can be of real help to the logging engineering departments of the forest schools.

1. The Congress can create, in each state represented in the Congress, a committee consisting of three practical, up-to-date loggers, whose functions should be to serve in an advisory capacity to the departments of logging engineering of the respective states. These committees should hold conferences with the faculties of the forest schools at least once each year. These conferences will serve to keep the school men thoroughly in touch with the field men and the field men with the school men. In this way the forest schools would be constantly checked up on the requirements in the field and the field men would get an idea of the limitations of the schools. While the schools should, and do, make their instruction decidedly practical, yet it must be understood, after all, that the technical courses must have a solid basis in theory and that the practical application of the theory must be made on the job. Through these committees, then, the men in the logging game could learn that the forest schools alone cannot produce practical loggers, and the graduate from the schools must complete his education in the woods. The committees which are recommended in this connection should be standing committees of the Congress.

### *Camp Can Be the Laboratory*

2. The Congress, through its members, can establish a definite plan by means of which students in logging engineering may obtain practical woods experience during summer vacations. Under normal conditions these students have no difficulty in securing employment of some sort in the camps. But mere employment is not the important thing. It is highly desirable that the right sort of employment be obtained, in order that these embryo logging engineers may have the best opportunity of studying the operation as a whole. In other words, this summer work should be made to connect up with the college work. It can be made as valuable as any laboratory work in school. It is fully appreciated that this may entail some little attention on the part of the operator and of his woods boss. Nevertheless, there should be, and I think there is, sufficient professional spirit on the part of operators to assist in this small way in helping to raise the standard of the logging engineering profession. It should be distinctly understood that an easy job is not the thing desired. The young chap wants to learn. If the logging boss would, for a a few minutes occasionally, assume the role of instructor, telling why and how certain things were done, the net result would be surprisingly great. This whole thing can be put over if some one forward-looking operator in each state, one who is interested in building young men as well as in business success, would assume the responsibility of placing these young fellows with his fellow operators. It means co-operation all around, but I believe, when the great benefits of the plan are understood, the necessary co-operation can be secured. The operators are going to use these men. The operators should assist in developing them.

### *Should Help Season Young Engineer*

3. Through the Congress, a real understanding can be reached relative to the status of the recently graduated logging engineer. In the past too much has been expected of him, by operators and woods bosses, when he has first gone out on the job. Strictly speaking, he is not a logging engineer at that stage of his development, and will not be until he is seasoned by woods experience. Those of us who have, for several years, been interested in the development of the logging engineer, realize fully his limitations at the time he finishes college. We know that his training in the woods, on the job, is just as important as his technical training in the schools. The civil engineer begins his professional career by dragging a chain or holding a rod. It's a long time before he gets behind the gun. The logging engineer should advance by the same process. He should be promoted slowly. He should not have responsibilities placed on him until he is able to carry them. All of us in the forest schools respect the abilities of the men in the logging game who have been trained in the school of hard knocks. You who have been trained in that school should reciprocate by giving due consideration to the training of the college man. Rawhiding may be all right for a bohunk, but it's poor business to apply it to an engineer. A Diesel engine requires a different type of treatment than a bull team. I believe the Congress can be instrumental in creating among operators an understanding, helpful attitude towards the young engineer, not alone because he needs some special consideration, but because the whole profession and the whole industry as well will be benefited thereby.

### *Co-operation Can Be Extended*

4. The Congress can create among its members a helpful attitude toward the forest schools. The schools recognize the value of knowledge possessed by the practical operators. The schools cannot afford to buy that type of experience for use in the lecture room. The men who are past masters in the logging game can afford, I think, to take an occasional day off to discuss before the young men in the forest schools subjects which they know, because of their many years of experience. The talk by the active man of affairs always brings a real inspiration to the lecture room. Possibly the practical logger will catch some of the enthusiasm of youth and get a real inspiration himself.

5. The Logging Congress can help the forest schools and through schools the entire industry by promoting research work to be prosecuted by the faculties of the forest schools. For years the colleges and universities have carried on extensive research work in agriculture, financed by state and federal appropriations. It appears just that a part of state appropriations for research, at least, should be devoted to research problems of interest to the lumber industry, in proportion to the relative importance of the lumber and agricultural interests in the respective states.

In these five ways the Pacific Logging Congress can render very material assistance to the forest schools. Careful consideration of them in the interest of the entire logging industry is respectfully recommended.

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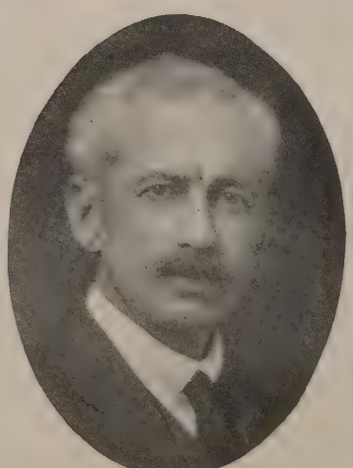
President Stewart: Dean Peavy has given us a most interesting paper here, and it is to be regretted that we can't take at least a half an hour or longer to have a more or less informal discussion of the forestry schools. The Congress, I believe, was originally formed for the principal purpose of developing the logging engineer, and I am rather ashamed of the limited time we are giving to that subject, but next year I hope different arrangements can be made.

We will now hear from R. W. Vinnedge, chairman of the resolutions committee.

## Western Forest School Heads in Attendance at Fifteenth Pacific Logging Congress

WALTER MULFORD
*Dean School of Forestry*
*University of California*



GEO. W. PEAVY
*Dean School of Forestry*
*Oregon Agricultural College*

E. T. CLARK
*Professor of Logging Engineering*
*University of Washington*

HUGO WINKENWERDER
*Dean School of Forestry*
*University of Washington*

# Resolutions Adopted by Fifteenth Pacific Logging Congress

## Submitted by R. W. Vinnedge, Chairman

**Support the Constitution.**

In some quarters of our nation there appears to be a tendency to depart from some of the fundamental principles of our government as conceived and perpetuated by the Constitution of the United States. We view with alarm the increasing tendency in these quarters mentioned to break down its provisions by specious amendments, notable among which is a recent nostrum aiming at a disruption of the present relationship between the executive, administrative and judicial departments of our national government. We believe the supreme court of the United States should perpetually perform the function of a check and balance for and between the other two principal departments. We believe in and are proud of the traditions of our nation, built up during the century and a half we have lived under the beneficent influence of this great document. We realize this government is not perfect. We realize it perhaps cannot be, yet we believe that even so we are still the most favored nation on the earth, and that this is due to our form of government as exemplified by the Constitution of the United States. We believe the time has come for Americans to give careful thought to this question and to curb the present tendency to depart from the essential provisions of this great charter, a heritage vouchsafed by our forefathers.

**Forest Protection and Replacement.**

We thoroughly realize the importance of forest protection and replacement, both of which call for more public and private effort. The Clarke-McNary bill represents a great advance in national policy, and we urge liberal appropriations to make it effective. Greater care with fire and better equipment to deal with it are responsibilities which also lie with us as an industry. We urge all loggers to keep abreast of developments to safeguard their operations, such as fire pumps, camp wardens and use of weather forecasts. The time has come to recognize the value of second-growth timber. Cut-over land should be protected with this in mind. New growth should not be unnecessarily destroyed by either settlers or lumbermen, especially where there is any doubt as to agriculture being the highest use of the land. Permanent forest production on land most suitable therefor calls for the development of both public and industrial policies with sound foundation of taxation, fire prevention and knowledge of tree growth. More knowledge along these lines is needed. We appreciate the research work done by public agencies, but no less commend the enterprise of many Pacific Coast lumber companies which have organized private research, such as that being conducted by the Western Forestry and Conservation Association.

**Weather Bureau and Fire Prevention.**

The study and investigative work carried on by the U. S. Weather Bureau officials and forest protective agencies during the past three years relative to the influence weather changes have upon the fire hazard have proven beyond doubt that a knowledge of the factors and forces controlling this influence is a most important matter in the work of fire prevention and control. The work already done, the fire warning forecasts sent out have been of great value to logging operators and forest protective agencies. It is an indispensable factor in burning slashings and promoting reforestation of cut-over lands. We heartily recommend the research work carried on during the past session by the Weather Bureau through its representatives, Geo. W. Alexander and Charles I. Dague, and earnestly urge that this work be continued and made permanent. We would impress upon our representatives in Congress the importance this work bears to the logging industry and urge them to use every means within reason to secure for the Weather Bureau an adequate appropriation to cover the costs of continuance of this investigative work.

**Pay Respects to Former Secretary.**

Following resolution passed by Congress by standing vote:

Whereas, The 15th session of the Pacific Logging Congress, in session at Portland, learned with sincere regret of the absence of Geo. M. Cornwall, necessitated by the orders of his physician; and

Whereas, The membership of the Congress is deeply sensible of the obligation we owe Mr. Cornwall for his genius and constructive ability in forming and maintaining the Pacific Logging Congress through the past years; therefore, be it

Resolved, That this resolution, bespeaking the love and respect this Congress bears him, be wired to him at his home in Berkeley, Cal., and to assure him of our earnest hope that the "donkey doctor" engaged by him to make over that splendid machine may soon and successfully return it to the job to run with its usual speed and efficiency.

**Appreciate Long-Bell Courtesy.**

We wish to express our deep appreciation of the hospitality accorded those in attendance at the 15th session of the Pacific Logging Congress by the Long-Bell Lumber Co. at Longview, Wash. Its conception of service as exemplified by the management of the Hotel Monticello and the other departments of its splendid organization merits the administration which is felt and expressed by the entire membership of this Congress.

**Endorse Forestry Schools.**

The forestry schools of our country play a prominent role in the upbuilding of our states. We wish to commend the standards attained and maintained by their faculties and the deans of their respective heads. The logging industry embraced within the scope of this Congress wishes to be helpful wherever and whenever possible, and we take this opportunity to restate the hope that they will call upon us when occasion requires. We particularly hope that the young men in these schools will avail themselves of any and all opportunities to gain employment in camps during the period of their schooling in order that they may at the earliest possible moment begin that actual contact with logging conditions and atmosphere which is such an indispensable correlative to their college experience.

**National Lumber Council.**

The 15th session of the Pacific Logging Congress is in accord with the views of John W. Blodgett, chairman of the Central Committee on Lumber Standards, on the subject of the formation of a national lumber council. We believe there should be some articulate national body to speak for lumber in all of its departments and branches. We believe in the promotion of a closer and more sympathetic understanding between all branches embraced by the industry where such arrangement is consistent with the state and federal law, and where the interests of those primarily involved, as well as the nation, will be promoted and conserved. We recommend that the board of directors apply to the central committee for membership for this Congress and appropriate $50 annually to cover the contribution suggested for regional associations.

**Regret Absence of E. G. English.**

While the 15th session of the Pacific Logging Congress has excelled, if possible, in point of attendance and interest manifested in the excellent program and discussions resulting therefrom, there has been a lack due

E. G. English

to the enforced absence of one of its founders and staunch supporters, Ed. G. English, of the English Lumber Co., Seattle. The Congress wishes to express, through this resolution, its sincere regret that we have been forced to carry on without him and to offer the hope that he will speedily recover and immediately mark up his calendar for the session in 1925.

**Remedy Camp Cookhouse Operation.**

The operation of the camp cookhouse as a department of the logging operations of this industry has been deficient and expensive. We have countenanced this defect for many years and have consistently delayed taking a constructive step to remedy the situation. We believe this Congress should take some step towards the formation of an adjunct to deal with the problems, and believe a fund subscribed by the operators represented in our membership should be used to carry on research work and to provide a source of advice and assistance to our boarding-house departments. We recommend that the board of directors give this suggestion serious consideration and take prompt steps in the direction suggested.

**Machinery and Accessory Exhibit.**

The resolutions committee of the 15th session of the Pacific Logging Congress has been presented with a tentative plan for the formation of a machinery and logging accessory exhibit to be made a part of future sessions of the Congress. We believe the plan as proposed has possibilities of mutual benefit, and we recommend that the board of directors of the Congress confer with those projecting this plan with a view to perfecting such an adjunct.

**Conservation of Forest Resources,**

Conservation of forest resources also extends to better use of the material we have or may produce. We particularly appreciate the constructive efforts of Secretary Herbert Hoover, of the Department of Commerce, to bring about co-operation between governmental agencies and our industry in utilization practices. Also, the investigative work of the Forest Service along utilization lines, and pledge our support to further practical advancement of these desired ends.

The Pacific Logging Congress desires to express its appreciation to C. M. Loysted & Co., of Seattle, for the installation of the Toots-E signal whistle in the convention hall and also at the St. Helens Inn, Longview.

We wish to express our appreciation of the efforts of the United States Forest Service in behalf of the lumber industry of the nation, and to particularly recommend its policy and the able officers representing it in the territory embraced by the membership of the Pacific Logging Congress, and we pledge our continued support to these officials in any practical and constructive projects they may institute for the mutual benefit of our industry and the welfare of the people of the nation.

The Pacific Logging Congress wishes to extend its sincere thanks to the city of Portland for the courtesies tendered during the 15th session of the Congress, and to assure the city officers that Portland has lived up to its well-earned reputation as a proper and cordial host. We appreciate the courtesies extended to us by Mayor Baker in addressing our initial session and assure him that the citizens of this splendid city have added to the reputation of Portland as typifying the real spirit of hospitality.

The Pacific Logging Congress expresses its sorrow at the death of Frank B. Cole, of Tacoma, Wash., who always took an active interest in the welfare of the Congress and whose skill as toastmaster at the annual banquets lent much to the success and enjoyment of those affairs.

For its spirit of cordial hospitality extended to its members during the 15th session, the Pacific Logging Congress wishes to express its appreciation to the Multnomah Hotel and to assure the management that it has done a great part in establishing Portland as a thoroughly up-to-date convention city.

R. W. VINNEDGE,
Chairman.
J. P. McGOLDRICK,
F. R. OLIN,
E. C. McGREGOR,
Committee on Resolutions.

Walter J. Ryan: I move that these resolutions be accepted and that the committee be heartily thanked for their efforts in preparing them.

E. W. Haines: I second the motion.

President Stewart: They are unanimously adopted. The nominating committee has suggested that W. A. Erwin, of the Crown-Willamette Paper Co., be named as director from Oregon, and that Joseph Irving and R. W. Vinnedge, respectively, be named as directors from the state of Washington, E. B. Chinn, of Seattle, retiring.

**Honorary Vice-Presidents Elected.**

The nominating committee has further suggested that George M. Cornwall and E. G. English, founders of the Pacific Logging Congress, be elected honorary vice-presidents.

A. H. Powers: I move that the nominations be accepted.

E. C. MacGregor: I second the motion.

President Stewart: It has been moved and seconded that these three gentlemen be named as directors of the Logging Congress, and that George M. Cornwall and E. G. English be elected honorary vice-presidents. All in favor of so doing will please rise. (All the members present stood.) I am sending the following telegram to our friend, Bolling Arthur Johnson:

"Pacific Logging Congress 15th annual session extends to you its hearty greetings and full appreciation of your great interest in our welfare and the many real things you have done for our industry. We all miss you and trust you will be with us next year."

**Ladies' Banquet.**

John T. Dougall: Mr. President, it is with pleasure that I am called upon to report to you the innovation of the first annual banquet for the ladies of the Congress. Some 40 of our ladies have already signified their intention to be present. It is fitting that this new department of our annual meetings should find its birth in Longview, Wash., in the midst of that atmosphere of southern hospitality, that has so quickly made a place in our hearts for our new friends, the Long-Bell Lumber Co. This banquet is given by S. M. Morris, vice-president and general manager of the Long-Bell company; and I move you that he be given a rising vote of thanks. (A rising vote of thanks was passed.)

Bob Jensen: Mr. President, it it with pleasure that I announce the fact that the future governor of the state of Washington has just entered the room, Colonel Hartley. (The audience applauded as Colonel Hartley walked to the platform.)

**A Word From Colonel Hartley.**

Colonel Roland H. Hartley: Mr. President and Gentlemen: This is indeed a courtesy that I appreciate more than I can tell. Now I know you have more business than you know how to transact here today in the time allotted to you. You hear me talk a lot. I have been traveling over the state for about 3000 miles, just got in here yesterday, have been talking all the time, and I am going just to thank you very much for this courtesy, and I hope to meet you all at Longview.

# The Annual Logging Congress Welfare Dinner

## Howard T. Lewis the Principal Speaker

THE annual welfare dinner, given by the industrial branch of the Y. M. C. A., was held Thursday evening in the Grand Ballroom of the Multnomah Hotel. Charles Puehler, international secretary Pacific region, was in charge. Ralph H. Burnside, president Willapa Lumber Co., Portland, Ore., presided as toastmaster. Preceding the dinner the guests listened to an address by President Coolidge, received by wire from Washington, D. C.

Toastmaster Burnside: The welfare dinner has become a habit of the Pacific Logging Congress. It seems to me very fitting that after two days' discussion of machinery and fuel and fire fighting, and all the other problems of logging, that we should, for the evening at least, turn from those mechanical things and consider for a little the most important element in our whole logging industry, and that is the men who use all these mechanical appliances. After all, it is the men that are our real problem.

Harry Stone, the general secretary of the Portland Y. M. C. A., spoke on the work of that organization in industry. He said in part:

Recently I visited South Chicago, where the U. S. Steel Corporation has bought a lot and turned it over to the Young Men's Christian Association, subscribing $300,000 to start a $750,000 plant for character building for the men of the steel industry of South Chicago. From there we went to where 12 industries had put in $450,000 towards one of these welfare plants. Here is a picture of one you are more familiar with at Longview.

This movement that Mr. Puehler represents and that I represent is simply a part of a great force trying to bring character into the lives of boys and men. We do it by play; we do it by exercise; we do it with education; we do it with singing.

Charles Puehler told of the buildings that are being promoted in Salem, Ore., and Aberdeen, Wash., and the wish of the Y. M. C. A. to enter every special field where it may be of help. He then introduced C. F. Nutter, secretary at Longview, who said that the building had been given to the Y. M. C. A. by Mr. R. A. Long after much careful consideration. It is being run to meet the needs of men and boys in industry. The speaker of the evening, Dr. Howard T. Lewis, dean of the college of business administration University of Washington, was introduced by Toastmaster Burnside. Dr. Lewis said in part:

## The Human Factor in Industry

WHEN Mr. Burnside first began the program tonight he said it seemed to him that it was altogether fitting that the last session, or at least one of the last sessions, of the Pacific Logging Congress should be one that was devoted to the problem of labor, to the problem of the men. I think it is altogether fitting that such should be the case; and, more than that, I think it is an evidence of very real progress that those who are interested in the direction of the problems of logging in this part of the country should turn aside from questions of mechanics to consider for a little while, at least, the problem of the human consideration that are involved in industry. I question a little bit, though, whether one may speak of it altogether as the problem of labor; for I wonder sometimes if, after all, it is a problem of labor as such. Is it not true that fundamentally the question of labor is a question of what can be done in the interests of men, their welfare, their happiness, their good will, the things which make for them a fuller and a better and a happier life?

You may take that, if you will, from any angle that you may choose; you may argue that fundamentally it is a wise thing for us to have in the firms with which we are connected a group of men who are satisfied, a group of men who are efficient, a group of men who stay on the job, a group of men who understand and who cooperate. I say, you may look at that as a question of profit, and profit there is. We have come to see that in the field of industry there is nothing more essential than that those with whom you and I as directors of industry work, shall be those who are willing to turn their thought and their attention in a co-operative fashion to meet the problems with which we are concerned. Engines will not run without men, and no engine runs so well as when it is operated by a man who understands his job and who is in sympathy with the engine. But the engine is only part of the problem, because, after all, the man who is in sympathy with the engine must at the same time be in sympathy with those who own that engine and who direct the sales of the products which are made as a result. This means that, using the term which Mr. Burnside used a moment ago, the problem of labor is the problem of human welfare.

I take it that the time is passing when we, as intelligent theorists on economic problems, can draw a distinction down the classes of society and say here is a group whose interests may well be advanced and there is a group whose interests may be advanced, and forget the fact that by the advancing of the interests of the one it is absolutely essential that the interests of the other operate equally in the same direction. The problem of labor is the problem of every man, whether he be owner, foreman or laborer. Regardless of his classification, or the source of his income, the problem of human welfare in industry is the problem of mankind itself.

### *Reconstruction Period in France*

Perhaps a half a century ago, I recall that there lived in France a man who thought deeply and keenly and well about the problems of economic concern in that country. France, you remember, in the middle of the last century was concerned with certain problems not altogether different from those with which we are concerned in this country today. France had

R. H. BURNSIDE
*Toastmaster at the Y. M. C. A. Welfare Dinner*

passed through the period of the Napoleonic wars. France had tried to place herself economically, financially and politically upon her feet. France was being influenced by a new movement which had come across Europe, a movement which we have come to consider as a democratic movement. There were many elements of danger in that, but there were also some elements of good. France was trying to meet that very complicated question of how to place herself on her feet socially, politically and economically, and France had adopted a good many different policies of one sort and another and they had not always brought about the very best of results. So this theorist of economic repute, one Bastiat by name, wrote a pamphlet which he chose to call "Things Seen and Things Unseen." In that pamphlet Bastiat endeavored to point out that, after all, things which appear on the surface, the top things, those things which first come to the eye, are not always the things of real consequence, but that down beneath those surface indications there are great, vital and powerful economics which in the long run determine the outcome of any policy adopted.

### *Relations of Government to Business*

I don't know whether those policies which Bastiat advocated were right or wrong; I am not concerned about that; but it does come to my mind time and time again that we, all of us, do the same thing. You know of men, I know of men, who say, "In my line of business, in my field of enterprise, there is only one way in which we can ever attain success. This is against us, that is against us. The government does not operate in the right direction. Legislation is bad. We are confronted by conditions over which we have no control. The only thing possible is that in some fashion or other we may be given the power, which the government can do for us, of fixing a price." Of course, you and I say that can't be done. But, you know, there are thousands of men who think it can. Here is the man who says, "My business for the past four years has been bad. It is due to the fact that the market has been glutted, or it has been due to this, that or the other thing. But," he says, "the only solution for my business is to go over and ask from somebody or something some kind of a subsidy." I raise the question as to whether any industry of any kind or under any conditions which requires a subsidy from the government or from anybody else to operate permanently is a business which you and I as consumers, as business men, as employers of labor, may be called upon to support. Is it not true that in the field of business, as elsewhere, an industry should stand upon its own feet? Encouragement in its early years it may well get; assistance it ought to have under certain conditions; but is it not true that, all things considered, an industry, if it be efficient, can stand upon its feet? We see what? We see that a subsidy from somebody will carry us over at the end of this year. We do not see that fundamentally through a long period of years it is a very doubtful and a very dubious policy.

There is another man who, working in the camps, says, "I know the only solution for the problem here is how to get control for us, you and I. We know these things; we know how to operate in the woods; we know the problems of the sawmill; all that is necessary, obviously, for success, is that you and I, who do the hard manual labor, be given control of the industry." What does he see? He sees the fact that sometimes he does not get a job when he would like to have it, because economic conditions are such that he can't get it. What doesn't he see? He doesn't see the fact that the man who is experienced in manual labor is not the man who by judgment, by experience and by training is fitted to oversee the big problems of management; and that, if you place the business in the hands of the men who do the manual work in the industries of this country, as some men would like to have done, in the long run there will be more men out of work than there are under any other regime.

### *Need for Treatise on Economics*

I say to the farmer, to the business man, to the laborer, there are so many problems, the things we see are not always the things that count. Some day, out of the vast flood of books that come from the presses of the country, I hope that somebody in this country will undertake to write another book, and I hope this book will be very different from a great many books which come now from the presses of the nation. I hope it may be a book which deals with the simple, fundamental features of economic life in a simple, fundamental fashion. Sometimes you and I wonder how it comes about that doctrines which you and I know are fallacious get such a tremendous grip upon men. I will tell you how it comes about. It comes about because the man who makes the argument does two things: First of all, he starts his story with an understanding of the psychology of the man to whom he is talking. The man remembers back, as we can all of us remember back, to the days when the conditions of the logging camps were not what they are now, and he tells the man about how the employer can fire him any time he chooses; he tells him a lot of things of that sort, and within the limited experience of the man he fails to understand what seems so obvious, and then from that very simple approach he starts to build up an argument, and when he builds it up—and this is the point I have in mind—he builds it up in simple language, words of one syllable, sentences that are direct and pointed. He tells the story simply. And, you know, if you start out to do a thing that way, you can in the end argue anybody into anything. We never have done that, the rest of us. Those of us who believe that many of these doctrines are pernicious say, "Well, it is all wrong," and that ends it, or else we start into an involved argument, with sentences so long and words so big that I doubt whether we understand their meaning ourselves. So, I say, some time when you want to create among large numbers of men an attitude toward industry and toward economic forces that are sound and true, I take it we have got to start at the same place; we have got to start back here and tell this story simply, and tell it in the experiences and in the terms and on the level of the understanding of the men to whom we are talking. I say that has not been done as largely as it ought to be done. And when that book is written I would venture to suggest that there are one or two things of tremendous concern that ought to be picked out and made of first concern.

I trust that when that book may be written, or when that argument is developed, the man who writes it, or the man who unfolds the argument, will start his argument with pointing out the fact, which men do not always understand or remember, because it is not understood well enough, that the economic order as you and I know is approximately a century and a quarter

old. I want him to start with that place. I want him to point out the fact that 125 years ago, at the very outside, there overcame England and the rest of Europe a change so stupendous industry that the economic life of men from that time on became vastly different; it was turned into entirely different channels. That was the day when steam power was first applied to machinery. That was the time when men first had to come in and live around the mill instead of doing their work out on their own farms, in their own places and in their own homes. That was the time when revolution came in agriculture; that was the time when root crops came to England, rotation, and all of that. What do I mean? It is this: I mean there came a change in the economic life of England which has since spread to the rest of the world, when men concentrated themselves into the cities under entirely new industrial conditions, wholly different from those which had been in use on the farms. The man who would not or could not practice the old type of agriculture left his farm and came into the city. We have been asked by some people to meet these new problems of industry that have developed under these new conditions, and at the same time to solve both the technical and engineering problems and the labor problems that have accompanied that change in so short a period as this, at most 125 years. I don't know how many thousands of years old the world is, but I know that, with the limited abilities of men, that type of problem cannot be solved reasonably in that period of time.

### *Level of Competition Raised*

In the second place, I want to emphasize the fact that this competition in industry, competition of one laborer with another, competition of one employer with another employer, is not the sort of thing either which sometimes we think it is. You know the story, and how the man says that competition is nothing but the law of the jungle. It is a case of every man get all he can regardless of anybody else. Of course I know, too, that there is much of truth in it, but I also know some other things. If I did not have confidence that the level of competition in the United States had been gradually raised in the past 100 years I would indeed be pessimistic. I know that there are things in competition that are not fair; I know there are things that are not right. Then my mind goes back to the times when the old packing plants could take anything they chose and put it in a little round can and label it on the outside and call it "potted ham." You and I bought it and we trusted it was potted ham on the inside. We had no way of knowing what it was. Then somehow or other men said, "No, that is not right. You may make a bigger profit than your competitor by doing that sort of thing, but to us some way it would seem that if you poison a man slowly without his knowledge, that is just as truly murder as though you struck a man over the head with a club; and if society has outlawed one kind of murder it ought to outlaw another kind of murder." My mind goes back to the railroad rebate situation and the times when rebates were the ordinary things, and that, we said, was unfair; that was not right. In other words, gradually the plane of competition has been raised. We have eliminated this, that and the other thing. Think what you may, gentlemen, about the federal trade commission, its personnel, its operation; I raise no questions about that; I only point ou that in the minds of the American people it was felt that something positive should be done to rule out of the game those considerations of unfair competition, such as local price cutting, which at one time were legal. I don't care whether it be written in the code of ethics of the Chamber of Commerce of the United States, as it is, or written into the code of ethics of dozens of business organizations over this country, that some things must be right and honorable and decent, or whether it be written upon the statute books of the nation, I am convinced that gradually the level of competition has been going up, and going up, and going up, to the end, if you will, that he who serves best will get the larger return; that he serves best who serves society best, and his profits will be correspondingly increased because he does. So I say, I hope somebody will tell the story of competition.

### *The Place of the Business Man*

Then there is one other thing which I hope that man may undertake to outline. Outside of emphasizing first of all the fact that the industrial problems and labor problems at the present time are new problems, comparatively speaking, and outside of the fact, in the first place, that this rising level of competition ethically is a real force for good, the third thing is the place of the business man.

That sounds strange. I was requested less than a year ago by an organization in this same state of Oregon to come before them and try to justify the business man. Strange, wasn't it? Here were a group, if you will, of business men, every one of them engaged in buying and selling goods all the time. They said, "Can you tell us what we may tell the man out on the street corner as a justification for our existence?" I say it is strange that we should have reached that point in the year of our Lord 1924 that we have to justify our existence at all. And I will tell you what I told them; and I mean this now for the man who is engaged in the mill, the man who is engaged in any kind of productive enterprise or indstry, any man who buys and sells across the counter, any man who is in business. What is his justification? Just this: There are men in this world who are specialists, they are particularly well trained as machinists; there are other men who are excellent lawyers and physicians; there are other men who are good because of their physique to do unskilled labor; and then there are other men who have particular ability in their power to assume certain risks of industry. When the socialist tells me that the government of the United States could, if it wanted to, undertake to direct the things which should be produced, and could see that those things were produced, and then could distribute those things to me and to you and to all of us, I know he is right. It can be done; there is no argument about that. Wasteful, yes; extravagant, yes; at a tremendous cost, yes; without half of our present wants satisfied and those poorly satisfied, yes. It could be done, though. Oh, we say, "No; that is a bad way; that is inefficient; that is uneconomic." The real way, after all, to see to it that man's wants are satisfied is to say to a man, "Here, if you see over there a chance, by selling goods to somebody, to provide him with something that he can't get now; if we see a chance to start a mill somewhere and produce something that is not now being produced, why, go to it and try it." If you think, in other words, you can assume a risk of starting a new business, of getting the labor and the raw materials and finding the market and doing the advertising and getting your credits, if you think you can do all of that, go to it and try it. We let them do that instead of letting the government do it. Now, if your judgment is good, if there is a need there to be satisfied, all right, you may have the profit; and if your judgment is bad, if you are not a good assumer of risk, if you are not able to judge what society needs, then you fail, shut up; take your loss and try something else; and instead of asking all society to bear the burden and the loss of mistakes, you take it to yourself.

That is the judgment of society. That is why the business man is justified. And so I say, anything which tends to curtail man's ability to seek out his own opportunities in business and to serve the needs of society, anything which makes that unjustifiable or impossible, within the reasonable wants of man, is bad.

### *Functions of Government*

What does that mean for the government? Does the government have no place in this organization? Certainly it does. There are some things that the government can do better than you and I can do. It can operate the army and the navy; that is true; but I take it after the government has done these things of that character, then the government of the nation has only one job left, and that is to see to it that this competition is fair; not to engage in the business; to assist a man, if you will through research, which private enterprise cannot afford to finance; to give information as broadly as possible along various lines of common interest; but I take it that that is about as far as the government can go.

I say the justification for the business man, regardless of what business he may be engaged in, is simply the justification that he takes the risk of supplying society with the things that society needs.

When the business man assumes that job he assumes it with responsibility. We say to him, "Here, if you make good on this job you can have your profit. If you don't make good you take your loss. You take it as an individual. You assume it like a man. You take it one way or another. But along with that right which we gave you, that privilege, if you will, we ask you also to take the responsibility."

What is that responsibility? That responsibility consists in providing a product which society can use at a price as low as is consistent with service. That is the first. And in the second place, I take it that the business man, irrespective of any technical questions of engineering, as a business consideration, shall see to it that his business is run in accordance with the very latest and the very best in acknowledged business practice. I know men engaged in big industry in the Northwest who contend that there is no such thing as a business cycle; that there is not any such thing. I know of men who say there is no possible way of even making a judgment as to what business is going to be. I realize fully all the limitations of business forecasting. It has been overdone; it has been overemphasized. I don't know how far we can ever know, but there is something in it. The man who does not adjust his advertising, who simply takes his advertising and shoots it out in the world like a shotgun, hoping that some of it will land, instead of trying to keep his advertising on the basis of acknowledged psychological appeals, and who tries to check on his advertising to see what pays and what does not before he sinks a lot of money in it, wastes money. The consumer pays for all that waste, that failure to understand. I can understand how the man sometimes out on the street and out on the farm, the man who does not have a chance himself to check with men who know better; the man who does not have a chance to check with anything except his own hand; the man up in the mountains, if you will, who never had a chance from month to month to talk to anybody, who has no chance in the world to develop because he has no check on his thoughts—I understand how men like that can feel. Last year 34 per cent of all the failures of the United States were due to incompetence; not to fraud, not to dishonesty, not to inexperience, not to the failures of other persons, but sheer incompetency. I say I understand how these men get sometimes a little bit bitter and say, "Well, we are caught here; we have got to do something. We are going to the government; we are going to do something else," and all that sort of thing. I say, we don't always quite get the point of view. So the business man who recognizes that the present economic order is a century old; the man who recognizes or understands that competition is fair or will be made fair, and that society will insist that it is fair; and the business man who understands that his place in society is to assume the risks of providing the things society needs and the responsibility of doing it decently and efficiently, that man has solved the problem of labor, because he has solved the problem of his relations to the public.

### *What Can Be Done by Co-operation*

We all heard that speech of the President's tonight. Mr. Barnes, preceding the president, said, among other things, that the ultimate test of business in this country is its service to the public. The motto of the Chamber of Commerce of the United States rests upon integrity, honesty and service to the public. I know of an office not so many miles away from here, in one corner of which there is a picture, a group of portraits framed. Some of you have seen it. I think there are 13 men in that picture, in a large frame, probably two by three, and under the picture of each man is his name, and then under one man's name is written his head office. One says Yokohama, one says Calcutta, one says London, one says San Francisco, one says Tokio, and so on. I looked at that picture one day as I was in the office and I said to the man, "What is the idea? What is this picture up here for?" "Well," he says, "there is quite a story to that." He said, "I think it was three years ago I saw a letter from the president of the firm in London. One of these 13 men had died, and on the occasion of his death this man wrote, 'I am sorry Mr. X is dead; it is the first break in the list of men, 13 of them, who have made this firm. For 28 years he has been with us; for 28 years these 13 men have worked together. He is the first one to break the chain.'" Then he pointed to another one, "You see that man?" "Yes, I see him." I began to take a human interest in those pictures then. They mean more than a dusty picture frame off in the corner of a man's office somewhere. He said, "That man died last year. The president of the firm said, 'That is the second link of this chain. That man worked in this firm 25 years—the second man has gone.'" Then the man to whom I was talking said, "I have been with this firm for 25 years myself."

### *Reward of Intelligent Endeavor*

You see what that means. For 28 years 13 men scattered the world around worked together. They builded a business through all sorts of trouble. When profits came they were glad, and when losses came they gritted their teeth and said, "We will come back and try it again," and each man passed advice to the next man; each man helped the other fellow with his problem; each one passed on what hints he could to the other fellow. For 28 years those men worke dtogether, and today as a result there is a firm which is known the world around, from London east to London again, a firm which serves mankind cheaply, efficiently, and makes a big profit in the doing, because those men could co-operate each with the other. I said to myself, "There is the way in which after all we will solve these problems of labor." It is when men can work together as those 13 men worked together, with unity of end, unity of effort year after year, patiently, intelligently, taking good and bad alike together. When men can do that and understand each other and get the other fellow's point of view and understand the purpose of the whole organism after all is to benefit everything, then will the problems of labor be solved, because the problems of the service of business to society will be solved.

Again, as Mr. Barnes said in Syracuse last June, the ultimate task as to what will happen to business in the United States will depend upon what business does for the people of the United States.

*Logging Congress excursionists who made the trip to Ryderwood, Wash., to view the electric logging*

# Congress Delegates View Electric Logging at Ryderwood

## Long-Bell Logging Headquarters Scene of Annual Excursion

THE annual Congress field trip to the logging operations of the Long-Bell Lumber Co. at Ryderwood, Wash., was not only eminently successful and largely attended but it was a revelation in many respects, even to the logger who operates extensively and with the most up-to-date equipment. Leaving Longview at 9 a. m. Saturday, October 25, in a train composed of five passenger coaches and a dynamo baggage car, the trip was made over the Northern Pacific to Vader, thence over the new line of the Longview, Portland & Northern to Ryderwood. The latter line is sand ballasted its entire length, including all spurs. This was the first passenger train to enter the new city. The train was under the direct management of Traffic Manager Guy Anderson, who exerted every effort to provide for the comfort of the excursionists. Vice-President S. M. Morris and R. F. Morse, manager Longview division of the Long-Bell Lumber Co., accompanied the party and did much to make the excursion a success.

At Ryderwood a modern city and a cordial welcome were found. The excursionists, numbering about 275, visited the community clubhouse, many of the mercantile establishments and the railroad yards and machine shops, the latter in course of construction.

Just prior to the arrival at Ryderwood the train was stopped to permit an inspection of the electric logging units at the first logging operation. These units are of the Willamette Iron & Steel Works type. At another operation, visited later in the day, electric logging units of the Washington Iron Works type were viewed. There were many expressions of wonderment and admiration at the manner in which these silent monsters perform their arduous work. In fact, only for the visibility of performance it did not seem like a logging camp—there was not noise enough. The high lead system is employed, the yarding and loading units silently but successfully garnering their harvest of sawlogs.

Electric current for the city of Ryderwood and the operation of the logging units is transmitted from the electric generating plant at Longivew over high-tension wires carrying 60,000 volts.

*The ladies who made the trip to Ryderwood, smiling for J. J. Donovan, of Bellingham, who took the photo.*

The distribution of current to the various units is effected through transformers at convenient stations throughout the operation. The wires are carried about the works in submarine type cables lying on the ground.

One of the evidences of welcome at Ryderwood was a Paul Bunyan brass band, the musicians seated in an open bandstand mounted on a sled with log runners. This sled was drawn about the city by a ten-ton Holt caterpillar. This is said to have been the first Paul Bunyan band to ever entertain a Logging Congress.

About 1 o'clock the visitors were invited to dinner in the company messhouse, and the building was filled to its limit, as were the guests. The badger fight, arranged by Logging Superintendent E. C. Cates, S. M. Morris and R. F. Morse, was the attraction scheduled immediately after dinner. This was the saving grace for the company; otherwise there would have been a food famine. Several pothounds had been imported from the South for this particular occasion. They had been feasted, also well fettered, that no undue advantage should be taken of the badger until he should be released from his house and was able to pick his vantage points in the arena in order to do effective combat with his adversaries. Dave Stewart had the honor of introducing the badger, which proved to be an exceedingly unusual species. Scientists who inspected it after the mud of battle cleared away assert it belongs to the pot branch of the China family.

Another train of six flat cars and a cab was in waiting to convey the visitors to another part of the logging operations, where the Washington Iron Works and Willamette electric logging units were at work, after which a trip over the main line of the logging road was made for some distance in order to view some of the timber and the contour of the country. Returning to Ryderwood, the excursion train conveyed the visitors to Longview, closing an interesting and instructive trip and bringing to a fitting climax one of the most successful sessions of the Pacific Logging Congress ever held.

Ryderwood is truly a modern logging camp city. It typifies the character of preparation which the Long-Bell Lumber Co. has made in all of its plans. The company constructed 242 family houses of three, four, five and six rooms, modernly equipped with every convenience. The town has a sewer system and is electric lighted. Streets are wide and every feature of the town bespeaks permanency, convenience and comfort. There are modern educational facilities consisting of an eight-room grade school and a high school, nine teachers being employed and a daily average attendance of 267 pupils.

The railroad yards and machine shops are being installed. The former will contain seven miles of trackage. One unit of the machine shop is being completed. This unit is 84x160 feet and has two engine pits. An addition to this building will be 160x180 feet, providing shelter for every locomotive in the service. The shops will be equipped with the most modern facilities and will be heated with Sturtevant circulating system. It is contemplated that if necessary the shops will be able to build a complete locomotive.

The Long-Bell Lumber Co.'s timber holdings are situated in an air line 11 miles north and west of Longview and comprise an area of approximately 90,000 acres. It is a compact body of timber, with a large, uniform stand of trees, 80 per cent of which is old-growth Douglas fir. The company has constructed 85 miles of horse trails through the tract, in addition to 60 miles of telephone lines, connecting the four fire stations and the lookouts. Each fire station is equipped with fire-fighting tools for 30 men,

*Left to Right—J. Frank King, head cruiser of the Long-Bell Lumber Co.; D. E. Stewart, president of the Pacific Logging Congress, and S. M. Morris, vice-president and general manager of western activities of the Long-Bell Lumber Co.*

*Left to Right—"Bob" Jensen presenting a silver collection to the cookhouse staff of the Long-Bell Lumber Co. David Davis (right) handing the money to E. C. Cates (center), the logging superintendent of the Long-Bell Lumber Co.*

*operations of the Long-Bell Lumber Company and inspect the headquarters camp of this company*

fire pump and 1000 feet of hose. Pack horses and camp equipment are kept in readiness during the fire season. J. Frank King is at the head of the company's timber protective organization and kept such a persistent vigil during the last fire season that not one fire started in the companys' holdings last year.

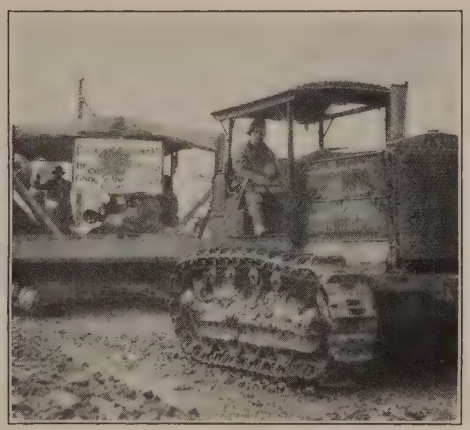
## The Logging Congress Banquet

THE 15th annual Logging Congress banquet, held at St. Helens Inn, Longview, Wash., Friday evening, October 24, from a standpoint of attendance, entertainment and speechmaking, was one of the big successes in the history of the Congress. There were 360 banqueters. President D. E. Stewart presided long enough to introduce the veteran toastmaster, J. J. Donovan, of Bellingham and ex-president of the Congress. The Long-Bell Lumber Co. was the host for the evening.

Starting the entertainment, a male chorus, composed of Major Griggs, Tom Shields, A. G. Labbé, R. W. Vinnedge, J. J. Dempsey and W. M. Leuthold, with Tom Murray at the piano, sang one or two numbers. There was real vaudeville furnished by a number of performers from Portland, and a fight and shooting affair staged by the cooks, waiters and Longview police, which for a time appeared so realistic that some of the guests were about ready to go home.

S. M. Morris, vice-president of Long-Bell Lumber Co., welcomed the Congress to Longview. The hospitality of the company was unbounded; the preparation for the entertainment of the visitors was complete in every respect. "Longview is honored to have you with us tonight," said Mr. Morris; "doubly honored when we stop to consider the importance of the industry that is represented by the men of this Congress, the most important industry in the Pacific Northwest. We can well afford to be proud of this opportunity of meeting the men of this Congress. Longview welcomes you with as gracious a welcome as she is capable of giving."

Toastmaster Donovan said that when he was impressed into service in the capacity of toastmaster at the Congress banquet at Tacoma two years ago he had two men stand up on the platform that might be viewed and cheered and made life members of the Congress. One of them was Geo. M. Cornwall, who was absent due to a slight physical difficulty, but was not suffering seriously only in his mind because he could not be present. The other gentleman was Ed English. These men are the daddies of the Congress. Mr. English was present and was hailed with a round of applause.



*The "Paul Bunyan" band of the Ryderwood operations of the Long-Bell Lumber Co. This ingenious combination of bandstand on skids and Holt caterpillar conveyed the music rapidly from place to place as occasion arose.*

The toastmaster carried out a well-defined speaking program, which included Colonel R. H. Hartley, of Everett, Wash., now the governor-elect of his state; Major E. G. Griggs, president St. Paul & Tacoma Lumber Co., Tacoma; Dean Hugo Winkenwerder, of the University of Washington; Major C. S. Cowan, district forester British Columbia Forest Branch; R. W. Vinnedge, Seattle; L. T. Murray, Tacoma; President D. E. Stewart; W. D. Beardshear, who had journeyed from South Dakota to attend the Congress; Jim Walker, on behalf of the lumber press. The bewitching hour of 12 o'clock was rapidly approaching when the banqueters joined in singing "Auld Lang Syne," and the 1924 Logging Congress was declared at an end.

Suitable entertainment had been prepared by the ladies of Longview for the visiting ladies. A dinner and card party at the Monticello Hotel was the attraction, which was attended by more than 40 ladies, with Mrs. S. M. Morris as hostess. Many of the ladies were among the excursionists to Ryderwood.

## Congress Notes

One cannot do justice to the sawmill of the Long-Bell Lumber Co. in a two-hour visit was the common remark of the excursionists to Longview. Most of them are coming back to do the job right, as few realized the magnitude of the enterprise.

One might wonder if the old-time steam logger would feel at home at Ryderwood. Aside from the occasional crash of a falling tree there is nothing to disturb the quiet of the woods but the hum of the electric motor and the singing of the lines through the blocks.

With characteristic liberality, the Congress manifested its appreciation of the effort to make each feature of the sessions pleasant. The banqueters contributed $52.37 as a "tip" for the dining-room crew and the excursionists "chipped in" $89.96 to be distributed among the help in the messhouse at Ryderwood.

J. H. Meister, manager of the logging department of the Shevlin-Hixon Company, Bend, Ore., kept the delegates in an uproar whenever he got on his feet. When someone stated that it required six to eight hours to move a steel spar skidder to a new setting Mr. Meister ventured the opinion that it must have been moved into the next county, for he moves his skidders in two hours or less.

*An exciting moment at the "badger fight." President Stewart has just released the badger, marked "X".*

*The observation train leaving Ryderwood for the woods operation of the Long-Bell Lumber Company.*

# Official Register of the Fifteenth Logging Congress

## Attendance Exceeds the Six Hundred Mark

A

Abrams, Faye, Booth-Kelly Lumber Co., Wendling, Ore.
Adams, Gaylord, Keystone Timber Co., Hoquiam, Wash.
Adams, Ralph, Portland, Ore.
Aitken, Geo. M., National Safety Council, Portland, Ore.
Alexander, J. L., B. C. Forest Branch, Victoria, B. C.
Allen, Chas. H., John A. Roebling's Sons Co., Portland.
Allen, Ed., Lyman Timber Co., Hamilton, Wash.
Allen, E. T., Western Forestry and Conservation Association, Portland.
Allen, J. B., Washington Forest Fire Association, North Bend, Wash.
Ambrose, F. F., Washington Forest Fire Association, Wickersham, Wash.
Ames, Fred, U. S. Forest Service, Portland.
Anderson, N., C. McC. Johnson Lumber Co., Reedsport, Ore.
Anderson, R. E., C. L. Best Tractor Co., San Leandro, Cal.
Austin, Andy, C. E. Atkins & Co., Seattle.
Austin J. P., American Lumberman, Seattle.
Autzen, Thos., Portland Manufacturing Co., Portland.
Anderson, Guy L., traffic manager Longview, Portland & Northern Railway, Longview, Wash.
Anderson, R. M., Longview Daily News, Longview, Wash.

B

Baker, A. F., Green Mountain Logging Co., Portland.
Baker, A. R., Hammond Lumber Co., Portland.
Baker, Geo. L., mayor of Portland, Portland.
Baldridge, Ira, Midway Logging Co., Stella, Wash.
Baldridge, J. V., Oregon-American Lumber Co., Vernonia, Ore.
Balzer, R. L., Clyde Equipment Co., Portland.
Barlow, F. C., The Prescott Co., Portland.
Barto, R., Cadwallader-Gibson Lumber Co., Manila, P. I.
Beardshear, W. D., Homestake Mining Co., Nemo, S. D.
Beauvais, Chas., Ostrander Timber Co., Ostrander, Wash.
Beckman, Victor H., Seattle.
Beebe, C. N., Canadian Westinghouse Co., Vancouver, B. C.
Behie, J. W., Snoqualmie Falls Lumber Co., Snoqualmie Falls, Wash.
Belford, Wm. L., Lima Locomotive Works, Lima, Ohio.
Benjamin, J. R., Merrill & Ring Lumber Co., Physh, Wash.
Berger, K., Washington Iron Works, Seattle.
Beuter, A. J., The Baldwin Locomotive Works, Portland.
Beyer, Edw. S., American Locomotive Co., Portland.
Billings, C. L., Edward Rutledge Timber Co., Coeur d'Alene, Idaho.
Billingslea, J. H., U. S. Forest Service, Olympia, Wash.
Bjorge, Oscar S., Clyde Iron Works, Duluth, Minn.
Blackburn, W. R., Corvallis Logging Co., Monroe, Ore.
Blakeley, S. A., Brooks-Scanlon Lumber Co., Bend, Ore.
Bloom, Andrew, Potlatch Lumber Co., Elk River, Idaho.
Bloom, Chandler, U. S. Steel Products Co., Portland.
Bodin, F. G., Swedish Steel Corporation, Seattle.
Boice, David H., Longview Chamber of Commerce, Longview, Wash.
Boles, N. W., The Shevlin Hixon Co., Bend, Ore.
Bordeaux, C. R., Mason County Logging Co., Bordeaux, Wash.
Bordeaux, Wilfred, Mason County Logging Co., Malone, Wash.
Bouschor, W. E., Willamette Iron & Steel Works, Seattle.
Bowen, L. D., Mutual Lumber Co., Bucoda, Wash.
Boyce, J. S., U. S. Department of Agriculture, Portland.
Brennan, B. W., Clear Lake Lumber Co., Clear Lake, Wash.
Brett, W. J., W. J. Brett Company, Portland.
Brewer, R., Forest Service, Castle Rock, Wash.
Brewer, V. A., Washington Forest Fire Association, Yacolt, Wash.
Briggs, Chas. G., Holland, Briggs & Noyes, Portland.
Bright, Geo. A., U. S. Forest Service, Portland.
Brown, O. W., O. W. Brown Locomotive & Supply Co., Seattle.
Brown, R. E., North Bend Timber Co., North Bend, Ore.
Bruce, Chas., Bruce Spark Arrester, Tuolumne, Cal.
Buck, C. J., Forest Service, Portland.
Buck, Shirley, Forest Service, Portland.
Bullis, R. H., Washington Forest Fire Association, Seattle.
Burns, D. S., Noyes-Holland Logging Co., Portland.
Burden, F. A., General Machinery & Supply Co., San Francisco.
Burns, W. J., Bridal Veil Timber Co., Bridal, Veil, Ore.
Burnside, Ralph H., Sunset Timber Co., Raymond, Wash.
Bush, Ben, Idaho State Land Department, Moscow, Idaho.
Byerly, J. A., Ostrander Railway & Timber Co., Ostrander, Wash.
Balzer, F. J., Clyde Equipment Co., Seattle.
Barwick, Seth E., Long-Bell Lumber Co., Longview, Wash.
Blakeley, C. L., Snoqualmie Falls Lumber Co., Snoqualmie Falls, Wash.
Booth, W. H., Clyde Equipment Co., Seattle.
Bowler, Harry N., A. P. Green Fire Brick Co., Portland.
Boyle, Thos. E., Mendocino Lumber Co., Mendocino, Cal.
Bross, F. W., Crown-Willamette Paper Co., Cathlamet, Wash.

C

Cain, G. W., West Coast Lumberman, Tacoma, Wash.
Calder, J. E., County Assessor, Montesano, Wash.
Calder, Lester E., Northwestern Lumber Co., Hoquiam, Wash.
Calhoun, G. V., Pacific Marine Supply Co., Seattle.
Callow, A. W., Wynooche Timber Co., Hoquiam, Wash.
Camp, Roy, Marshall-Wells Hardware Co., Portland.
Campbell, Royston, E., Eastern & Western Lumber Co., Portland.
Caverly, Chas. Walville Lumber Co., Walville, Wash.
Champion, W. C., Clyde Iron Works Sales Co., San Francisco.
Chapler, R. H., Western Forestry & Conservation Association, Portland.
Chapman, C. S., Weyerhaeuser Timber Co., Tacoma.
Christensen, C. M., LaDee-Christensen Logging Co., Portland.
Chriswell, F. W., Pacific Car & Foundry Co., Seattle.
Clapperton, C. E., Deer Island Logging Co., Deer Island, Ore.
Clark, E. T., college of forestry University of Washington, Seattle.
Clark, Wilson, Clark & Wilson Lumber Co., Linnton, Ore.
Coats, A. F., Coats Driving & Boom Co., Tillamook, Ore.
Cobban, R. J., Westinghouse Electric & Manufacturing Co., Portland.
Coleman, Norman F., Loyal Legion Loggers and Lumbermen, Portland.
Collins, Alton L., Ostrander Railway & Timber Co., Ostrander, Wash.
Collins, E. S., Ostrander Railway & Timber Co., Ostrander, Wash.
Conner, M., E. C. Atkins & Co., Portland.
Cooper, Frank H., Simonds Saw & Steel Co., Seattle.
Corkery, Wm., Donovan-Corkery Logging Co., Aberdeen, Wash.
Cowan, C. S., B. C. Forest Service, Vancouver, B. C.
Cronemiller, Lynn F., Oregon State Board of Forestry, Salem, Ore.
Coomb, Robert, Jr., Washington Forest Fire Association, Port Angeles, Wash.
Crosby, E. H., Sunset Timber Co., Sutico, Wash.
Crosby, W. E., West Coast Lumberman, Seattle.
Cross, Montie, Boise Payette Lumber Co., Cabarton, Idaho.
Curran, C. E., Continental Lumber & Pole Co., Kitchener, B. C.
Coffee, B. E., Lyman Timber Co., Hamilton, Wash.
Coman, C. A., Clarke County Timber Co., Yacolt, Wash.
Conlogne, J. T., Moore Mill & Lumber Co., Bandon, Ore.
Chipman, L. L., Long-Bell Lumber Co., Longview, Wash.
Cornwall, Geo. F., The Timberman, Portland.
Cowden, Norton, Silverton Lumber Co., Silverton, Ore.
Cox, F. J., Clyde Equipment Co., Portland.
Cox, Hugh F., Loggers & Contractors Machinery Co., Portland.

D

Dafoe, W. A., Bucyrus Company, Portland.
Danaher, James, Jr., Michigan-California Lumber Co., Camino, Cal.
Davidson, E. J., Fairbanks-Morse & Co., Portland.
Davis, A. W., E. C. Atkins Company, Portland.
Davis, Carl L., Coos Bay Lumber Co., Marshfield, Ore.
Davis, David, The Timberman, Portland.
Day, Rube, Lyon, Hill & Co., Port Angeles, Wash.
Demarest. E. W., Pacific National Lumber Co., Tacoma.
Dempsey, John J., Dempsey Lumber Co., Tacoma.
Denman, D. S., Northern Redwood Lumber Co., Korbel, Cal.
Dennis, Henry, St. Paul & Tacoma Lumber Co., Tacoma.
Dennison, H. W., C. M. Lovsted & Co., Seattle.
Des Brisay, Percy, B. C. Mills Timber & Trading Co., Vancouver, B. C.
Dickinson, M. H., Lidgerwood Manufacturing Co., Tacoma.
Digby, J. M., Washington Forest Fire Association, Seattle.
Dickson, T. C., Pacific States Lumber Co., Tacoma.
Disch, Geo. X., Marshall Wells Company, Portland.

*Left—"Bob" Jensen, official announcer for the Congress, and (right) Roy F. Morse, general manager of the Longview division of the Long-Bell Lumber Co.*

D

Donovan, J. J., Bloedel Donovan Lumber Mills, Bellingham, Wash.
Downey, Geo. P., Simonds Saw & Steel Co., Portland.
Doyle, W. B., The Whitney Company, Garibaldi, Ore.
Drake, Geo. L., U. S. Forest Service, Portland.
Drisko, E. B., Seattle Hardward Co., Seattle.
Duke, C. A., Stout Lumber Co. of Oregon, North Bend, Ore.
Dunham, Forrest T., National Lumber & Manufacturing Co., Hoquiam, Wash.
Dunn, W. H., Hammond Lumber Co., Portland.
Dwyer, Geo. A., Coos Bay Lumber Co., Marshfield, Ore.
David, Peter, Vulcan Powder Co., Seattle.
Delvin, R. B., Sessions Engineering Co., Portland.
Duncan, W. S., Longview, Wash.
Dougall, John T., secretary Pacific Logging Congress, Portland.
DeSpain, Ferdinand, Long-Bell Lumber Co., Longview, Wash.

E

Earling, H. B., Milwaukee Land Co., Seattle.
Edmondson, George L., W. H. Worden Company, San Francisco.
Edwards, W. G., University of California, Berkeley, Cal.
Engel, Herman E., M. R. Smith Lumber & Shingle Co., Moclips, Wash.
Entwistle, Wm., Washington Forest Fire Association, Seattle.
Epton, F. G., Evinrude Motor Co., Portland.
Ericson, O. F., U. S. Forest Service, Portland.
Erwin, W. A., Crown-Willamette Paper Co., Astoria, Ore.
Eshom, D. E., Retail Lumberman, Kansas City, Mo.
Evans, L. H., A. B. Daley & Co., Marshfield, Ore.
English, E. G., English Lumber Co., Seattle.
English, Norman A., Wood & English, Ltd., Vancouver, B. C.

F

Fagan, Chas. C., Smith & Watson Iron Works, Portland.
Falco, F. T., Pacific Car & Foundry Co., Portland.
Farr, Wm. E., Wm. E. Farr, Longview, Wash.
Featherston, W. A., Potlatch Lumber Co., Helmer, Idaho.
Filberg, R., Comox Logging & Railway Co., Vancouver, B. C.
Finney, Jack, White Star Lumber Co., White, Wash.
Fitzgerald, J. B., Four L Bulletin, Portland .
Fleck, J. G., Oregon Coast Range Lumber Co., Grand Ronde, Ore.
Flora, Gus, Flora Logging Co., Carlton, Ore.
Flora, J. C., Flora Logging Co., Carlton, Ore.
Forbes, E. G., Bloedel Donovan Lumber Mills, Skykomish, Wash.
Forsberg, John H., Bridal Veil Timber Co., Bridal Veil, Ore.
Foss, P. B., Henry Disston & Sons, Seattle.
Francis, R. W., Lewis Mills & Timber Co., South Bend, Wash.
Franklin, E. N., C. M. Lovsted & Co., Seattle.
Freydig, Paul E., Clark & Wilson Lumber Co., Wilark, Ore.
Frink, Gerald, Washington Iron Works, Seattle.
Fromme, R. L., U. S. Forest Service, Olympia, Wash.
Fuller, H. S., Pawling & Harnischfeger Co., Portland.
Fislun, H. H., Bear Creek Logging Co., Portland.
Fehnel, E. T., Pacific Car & Foundry Co., Portland.

G

Gaffney, E. J., Edward Rutledge Timber Co., Coeur d'Alene, Idaho.
Gardner, A. A., Henry Disston & Sons, Seattle.
Gavin, E. P., Williamsport Wire Rope Co., Williamsport, Pa.
Geho, W. O., Zimmerman-Wells-Brown Co., Portland.
Gemmill, Geo. B., Puget Sound Machinery Depot, Seattle.
Gervish, E. T., Brooks-Scanlon Lumber Co., Bend, Ore.
Gibbons, W. H., U. S. Forest Service, Portland.
Gilmour, Hugh B., Workmen's Compensation Board, Vancouver, B. C.
Gilson, Chris, Seattle.
Girard, James W., Fred Herrick Lumber Co., Burns, Ore.
Glover, A. E., Oregon Coast Range Lumber Co., Grand Ronde, Ore.
Goodwin, W. N., McKenna Lumber Co., McKenna, Wash.
Goodyear, T. S., State Department of Forestry, Olympia, Wash.
Gough, Evan, Wire Rope & Manufacturing Equipment Co., Seattle.
Graue, C. O., Edward Rutledge Timber Co., Coeur d'Alene, Idaho.
Graves, H. G., Evinrude Motor Co., Oakland, Cal.
Greaves, Fred G., Pawling & Harnischfeger Co., Seattle.
Green, E. O., Lyon, Hill & Co., Port Angeles, Wash.
Green, E. H., Oregon Lumber Co., Dee, Ore.
Gregory, Jas., Peterman Manufacturing Co., Tacoma.
Guthrie, John D., U. S. Forest Service, Portland.
Gwynn, H. C., Lamb Lumber Co., Vancouver, B. C.
Gibbs, A. L., Longview, Wash.
Gillespie, Robt, Mill & Mine Supply Co., Seattle.
Gorton, C. B., Sessions Engineering Co., Portland.
Gray, R. E., Snoqualmie Falls, Wash.
Griggs, Everett G., St. Paul & Tacoma Lumber Co., Tacoma.
Grubb, Frank E., F. B. Mallory Company, Portland.

H

Hafenbrack, G. M., Long-Bell Lumber Co., Longview, Wash.
Haines, E. W., Columbia Timber Co., Vernonia, Ore.
Hammond, F. W., John A. Roeblings Sons Co., San Francisco.
Hance, A. R., Bucyrus Company, Portland.
Hanson, Wm., Hanson Logging Co., Vancouver, B. C.
Harmer, H. P., Pacific Car & Foundry Co., Portland.
Haseman, C. T., Hammond Lumber Co., Mill City, Ore.
Hawkins, Russell, Jr., The Whitney Company, Garibaldi, Ore.
Hays, L. T., U. S. Steel Products Co., Seattle.
Helmer, Wm., Potlatch Lumber Co., Bovill, Idaho.
Hennessy, J. P., The Shevlin-Hixon Company, Bend, Ore.
Herzig, A. S., Hammond Lumber Co., Samoa, Cal.

H

Hickok, Chas. F., The Stout Lumber Co. of Oregon, North Bend, Ore.
Hill, J. W., The Holt Manufacturing Co., Portland.
Hodgson, A. H., U. S. Forest Service, Portland.
Hoeller, T. A., American Hoist & Derrick Co., Seattle.
Hoffman, B. E., U. S. Forest Service, Portland.
Horn, Albert E., General Petroleum Corporation, Portland.
Horton, Lynn, Corvallis, Ore.
Hummel, W. G., state director of vocational training, Olympia, Wash.
Hungerford, Geo. A., Carlsborg Mill & Lumber Co., Carlsborg, Wash.
Hukill, R. W., Hammond Lumber Co., Kelso, Wash.
Hurlow, Hugh, Jr., Williamsport Wire Rope Co., Tacoma, Wash.
Hyndman, A., Lewis Auto Burner Control, Tacoma.
Hardenbergh, Geo. E., Hofius Steel & Equipment Co., Seattle.
Hartley, Roland H., Irving-Hartley Logging Co., Everett, Wash.
Hauser, Kenneth D., Hauser Bros., Portland.
Hayes, Edmund, Jacobson-Reid Lumber Co., Rainier, Ore.
Hays, Geo. S., Longview Co., Longview, Wash.
Hewitt, W. H., St. Paul & Tacoma Lumber Co., Tacoma.
Hofius, Lacey, Hofius Steel & Construction Co., Seattle.
Houston, E. H., Long-Bell Lumber Co., Longview, Wash.
Houston, Geo. A., Long-Bell Lumber Co., Kansas City, Mo.
Humber, Carroll C., Long-Bell Lumber Co., Longview, Wash.

I

Innes, Frank R., Sessions Engineering Co., Portland.
Isaacson, Paul, Young Iron Works, Seattle.
Irving, Joseph, Sultan Railway & Timber Co., Everett, Wash.

J

Jacobs, A. W., Western Forestry and Conservation Association, Portland.
Jacobson, Norman S., Western Forestry and Conservation Association, Portland.
Janzen, Daniel H., Corvallis Ore.
Jeffrey, T. H., Coos Bay Lumber Co., Marshfield, Ore.
Jenkins, V. S., V. S. Jenkins Company, Seattle.
Johns, Clarence C., U. S. Steel Products Co., Portland.
Johnson, Geo. W., Puget Mill Co., Seattle.
Jones, H. L., Lyman Timber Co., Hamilton, Wash.
Joy, Geo. C., Washington Forest Fire Association, Seattle.
Jackson, A. R., E. C. Atkins & Co., Portland.
Jeffrey, T. H., Coos Bay Lumber Co., Marshfield, Ore.

K

Keith, R. H., Black Steel & Wire Co., Portland.
Kelly, A. W., The Baldwin Locomotive Works, Portland.
Kennedy, C. T, Klement & Kennedy, Fortson, Wash.
Kerns, Blaine L., Westinghouse Electric & Manufacturing Co., Seattle.
Kerry, A. S., Kerry Timber Co., Kerry, Ore.
Kerr, J. R., McLennon-McFeely Company, Vancouver.
King, J. Frank, Long-Bell Lumber Co., Longview, Wash.
Kinker, E. H., Three Lakes Lumber Co., Three Lakes, Wash.
Kinney, Wm. S., Robt. C. Kinney, Astoria, Ore.
Kittle, G. Bruce, Lima Locomotive Works, Lima, Ohio.
Klein, P. F., Polson Logging Co., Hoquiam, Wash.
Kline, C. W., Portland, Ore.
Klobucher, Frank, Fred Herrick Lumber Co., Burns, Ore.
Knapp, F. Malcolm, University of British Columbia, Vancouver, B. C.
Knight, P. F., Mutual Lumber Co., Bucoda, Wash.
Kniskern, Lewis T., National Lumber & Manufacturing Co., Hoquiam, Wash.
Koster, C. L., Koster Products Co., Portland.
Krafsic, J. F., E. I. duPont-deNemours & Co., Portland.
Kramer, W., Clark & Wilson Lumber Co., Portland.
Keys, Ed. M., Trojan Powder Co., Seattle.
Kirkpatrick, Harry A., Continental Lumber & Pole Co., Kitchener, B. C.

L

Labbe, A. G., Willamette Iron & Steel Works, Portland.
Laird, A. W., Potlatch Lumber Co., Potlatch, Idaho
Lamb, Frank H., Wynooche Timber Co., Hoquiam, Wash.
Lang, F. S., F. S. Lang Manufacturing Co., Seattle.
Langmack, J. J., Eclipse Manufacturing Co., Portland.
LaPlant, H. A., Skagit Mill Co., Lyman, Wash.
Lawson, W. H., Lawson Logging Co., Toledo, Ore.
Leckenby, Fred, Fred Leckenby, Tacoma.
LeCount, C. M., General Electric Co., San Francisco.
Leuthold, W. M., Deer Park Lumber Co., Deer Park, Wash.
Lewis, A. L., Clear Lake Lumber Co., Clear Lake, Wash.
Lewis, Foss B., Simonds Saw & Steel Co., Portland.
Lewis, B. R., Clear Lake Lumber Co., Clear Lake, Wash.
Logan, L. L., Oregon Coast Range Lumber Co., Grand Ronde, Ore.
Loney, E. J., Powers, Ore.
Long, J. A., Boise Payette Lumber Co., Boise, Idaho.
Loveridge, A. J., Clemons Logging Co., Melbourne, Wash.
Lummus, W. H., American Hoist & Derrick Co., St. Paul, Minn.
Lundeen, A. R., Inman-Poulsen Lumber Co., Vernonia, Ore.
Lakin, James L., Western Loggers Machinery Co., Portland.
Laughlin, Clint, The Long-Bell Lumber Co., Hollywood, Cal.
LeDoux, A. R., St. Paul & Tacoma Lumber Co., Tacoma.
Levy, Geo., Puget Sound & Alaska Powder Co., Portland.
Loebe, Fred A., Sessions Engineering Co., Portland.

M

MacDaniels, E. H., U. S. Forest Service, Portland.
Macdonald, A. R., F. B. Mallory Company, Portland.
MacFarlane, C. E., Cavano Logging Co., Seattle .
Madigan, Fred H., Portland.
Manary, James, Manary Logging Co., Portland.
Markel, Dan, The Oregonian, Portland.
Mackell, Harry L., Y. M. C. A., Portland .
Markham, John H., J. H. Markham Engineering Co., Centralia, Wash.
Mason, Fred T. Mason & Stevens, Portland.
Maxwell, R. R., Massett Timber Co., Buckley Bay, B. C.
Meany, J. M., Lidgerwood Manufacturing Co., Portland.
Meister, J. H., Shevlin-Hixon Company, Bend, Ore.
Merriam, Lawrence C., Mason & Stevens, Portland.

M

Merrifield, E. C., Washington Forest Fire Association, Sultan, Wash.
Meighan, W. A., E. H. Edwards Company, Portland.
Meserve, A., Milton Creek Logging Co., Portland.
Miller, O. R., Koster Products Co., Portland.
Mills, Norman W., The Skookum Co., Portland.
Mills, Russell, Sauk River Lumber Co., Darrington, Wash.
Mitchell, Walter F., Sessions Engineering Co., Portland.
Moline, F. H., Pacific Car & Foundry Co., Seattle.
Moore, Archie P., B. C. Lumberman, Vancouver, B. C.
Moore, E. O., Deer Park Lumber Co., Deer Park, Wash.
Morgan, Joseph G. G., North Western Lumber Co., Hoquiam, Wash.
Moore, R. D., Manley-Moore Lumber Co., Tacoma.
Morris, A. J., Abernethy & Lougheed, Vancouver, B. C.
Morton, Arthur, Cron & Dehn, Seattle.
Muck, Lee, U. S. Indian Forest Service, Spokane, Wash.
Mulford, Walter, University of California, Berkeley, Cal.
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Munro, Walter, Mason County Logging Co., Bordeaux, Wash.
Murphy, A. D., The Pacific Lumber Co., Scotia, Cal.
Murray, L. T., West Fork Logging Co., Tacoma.
McCaffrey, L. M., Flora Logging Co., Carlton ,Ore.
McClure, Horace, American Lumberman, Seattle.
McCory, E. R., A. C. White Lumber Co., Dover Idaho.
McCoy, W. B., McCoy-Wilson, Ltd., Vancouver, B. C.
McFadon, Donald, Maine Logging Co., Tacoma.
McGillicuddy, B. H., Mason County Logging Co., Bordeaux, Wash.
McGoldrick, J. P., McGoldrick Lumber Co., Spokane, Wash.
MacGregor, E. C., Boise Payette Lumber Co., Boise, Idaho.
McGuire, Frank C., Coats Driving & Boom Co., Tillamook, Ore.
McIntyre, D. G., Skagit Steel & Iron Works, Sedro-Woolley, Wash.
McKay, Duncan, Washington Forest Fire Association, Mt. Vernon, Wash.
McLeod, G. B., Hammond Lumber Co., Portland.
McLeod, G. H., Hazard Manufacturing Co., Portland.
McNeil, D. L., Oxweld-Acetylene Co., Portland.
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McPhee, R. G., Spokane Press, Spokane, Wash.
McClelland, J. M., Longview Daily News, Longview, Wash.
McDonald, F. A., Long-Bell Lumber Co., Longview, Wash.
McAvoy, John J., Cron & Dehn, Seattle.
Mosher, S. H., Pacific Fire Extinguisher Co., Seattle.
Morse, Roy F., Long-Bell Lumber Co., Longview, Wash.
Morris, S. M., Long-Bell Lumber Co., Longview, Wash.
Miller, O. H., United Commercial Co., Portland.
Miller, C. S., Miller & King, Longview, Wash.
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N

Neff, Phillip, Forest Service, Missoula, Mont.
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Neville, John H., Walville Lumber Co., Walville, Wash.
Newbegin, Geo. D., Cascade Timber Co., Tacoma.
Nogle, C. G., Potlatch Lumber Co., Bovill, Idaho.
Norris, H. D., Lidgerwood Manufacturing Co., Portland.
Niles, H. L., Clyde Equipment Co., Portland.
Nelson, N. E., Oregon Lumber Co., Portland.

O

O'Brien, D. J., D. J. O'Brien Logging Co., Ltd., Vancouver, B. C.
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P

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Person, Alva W., official reporter, Portland.
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Pumphrey, F. W., Western Loggers Machinery Co., Portland.
Perine, H. B., Perine Machinery Co., Seattle.

Q

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R

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Remlinger, A. L., John A. Roebling's Sons Co., Seattle.
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Richardson, R. C., The Pacific Lumber Co., Scotia, Cal.
Richardson, W. F., John A. Roebling's Sons Co., Seattle.
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R

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Redmon, Frank M., Westinghouse Electric & Manufacturing Co., Portland.
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Roberts, J. H., Simonds Saw & Steel Co., Portland.

S

Scanlon, R. H., M. J. Scanlon Lumber Co., Massack, Cal.
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Schafer, John D., Schafer Bros. Logging Co., Brady, Wash.
Schafer, Peter, Schafer Bros. Door & Lumber Co., Montesano, Wash.
Schauer, E. W., Oregon Lumber Co., Baker, Ore.
Schoen, F. R., Pacific Hoist & Derrick Co., Seattle.
Schumacher, T. W., F. G. Foster Co., Hoquiam, Wash.
Scott, Herbert I., E. H. Edwards Company, Seattle.
Scritsmier, F. S., Lyon, Hill & Co., Port Angeles, Wash.
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Shaw, Frank M., North Bend Timber Co., North Bend.
Shaw, R. S., Kerry Timber Co., Kerry, Ore.
Ore.
Sheely, Fred R., Lima Locomotive Works, Portland .
Shelby, C. D., Clemons Logging Co., Montesano, Wash.
Shields, C. A., McKenna Lumber Co., McKenna, Wash.
Shields, T. M., Simonds Saw & Steel Co., Seattle.
Shines, A. C., Winlock & Toledo Logging & Railroad Co., Toledo, Wash.
Siequist, J. A., Westinghouse Air Brake Co., Seattle.
Sinrud, P. L., Blackwell Lumber Co., Fernwood, Idaho.
Smart, Ted, Smith & Watson Iron Works, Portland.
Smilie, R. S., Lidgerwood Manufacturing Co., San Francisco.
Smith, E. W., Clyde Equipment Co., Portland.
Smith, J. H., Western Cooperage Co., Portland.
Smith, L. H., State Forestry Department, Salem, Ore.
Smith, Peter, Portland.
Smith, R. M., North Western Lumber Co., Hoquiam, Wash.
Smith, W. G. E., Smith & Watson Iron Works, Portland.
Somers, M. F., Coos Bay Lumber Co., Marshfield, Ore.
Somervell, Duane S., E. H. Edwards Co., San Francisco.
Soule, Thos. C., Stearns Logging Co., Hoquiam, Wash.
Southerland, J., St. Paul & Tacoma Lumber Co., Bellingham, Wash.
Springer, James, M. J. Scanlon Lumber Co., Massack, Cal.
Stark, W. J., John A. Roebling's Sons Co., Seattle.
Starker, T. J., Oregon Agricultural College, Corvallis, Ore.
Startup, G. G., Wallace Lumber & Manufacturing Co., Sultan, Wash.
Stephens, L. D., Stephens-Bird Lumber & Logging Co., Monroe, Wash.
Stephens, R. E., Feenaughty Machinery Co., Portland.
Stevenson, G. E., U. S. Forest Service, Portland.
Stewart, D. E., Crossett-Western Co., Portland.
Stewart, LaSells, Bohemia Lumber Co., Cottage Grove, Ore.
Stendel, Sam, Pacific States Lumber Co., Selleck, Wash.
Stock, Roland H., National Lumber & Manufacturing Co., Hoquiam, Wash.
Strite, Dan J., The Whitney Company, Idaville, Ore.
Swigert, Ernest G., Electric Steel Foundry, Portland.
Synnestvedt, H., Washington Iron Works, Seattle.
Sypher, Geo. B., Western Operators' Association, Seattle.
Sampson, J., U. S. Steel Products Co., Portland.
Sapp, A. W., Mason County Logging Co., Bordeaux, Wash.
Sander, Wm., Snoqualmie Falls Lumber Co., Snoqualmie Falls, Wash.
Saunders, W. A., Longview National Bank, Longview, Wash.
Scanlan, Edward P., Bear Creek Logging Co., Portland.
Shaw, Wm. C., Smith & Watson, Portland.
Sinnock, P., logging railroad engineer, Portland.
Smith, B. H., Jr., Long-Bell Lumber Co., Longview, Wash.
Smith, Kenneth, Long-Bell Lumber Co., San Francisco.
Smith, W. H., Long-Bell Lumber Co., Longview, Wash.
Soley, Chas., Oregon Lumber Co., Dee, Ore.
Strout, F. R., Snoqualmie Falls Lumber Co., Snoqualmie Falls, Wash.

T

Talbot, F. C., Puget Mill Co., Seattle.
Taylor, Clifford D., Willamette Iron & Steel Works, San Francisco.
Thatcher, J. G., John A. Roebling's Sons Co., Portland.
Thompsen, Andrew, Seattle.
Thompson, B. H., Lincoln Creek Lumber Co., Centralia, Wash.
Thompson, F. H. Crossett-Western Co., Knappa, Ore.
Tippie, Ray, Crown-Willamette Paper Co., Astoria, Ore.
Townes, H. H., Federated Metals Corporation, Portland.
Travers, L. B., State Department of Vocational Education, Olympia, Wash.
Troyer, M. D., Clyde Iron Works Sales Co., Spokane, Wash.
Truedson, S., Washington Forest Fire Association, Port Orchard, Wash.
Tucker, Chas. E., Mechanical Rubber Co., Cleveland, Ohio.
Turlay, Harold, Wespar Logging Co., Warren, Ore.
Turner, Frank L., Case Shingle & Lumber Co., South Bend, Wash.
Turney, H. L., Western Loggers Machinery Co., Portland.
Tyler, L. L., Department of Labor and Industries, Olympia, Wash.
Taber, W. R., Long-Bell Lumber Co., Longview, Wash.
Theuer, J. A., Canyon Lumber Co., Everett, Wash.

V

Van Fleet, H. W., Lidgerwood Manufacturing Co., Portland.
Veatch, M. L., Stetson-Ross Machine Co., Seattle.

V

Vinnedge, R. W., North Bend Timber Co., North Bend, Wash.
Voleske, John, The Voleske Tool Co., Portland.
Vandercook, Wesley, Long-Bell Lumber Co., Longview, Wash.

W

Wahl, John, Clemons Logging Co., Montesano, Wash.
Wakeman, Wm. J., Gales Creek Logging Co., Glenwood, Ore.
Walker, Geo. L., E. H. Edwards Company, Portland.
Walker, Joe, Cascade Timber Co., Alder, Ore.
Walker, J. C., Lumbermen Publishing Co., Minneapolis, Minn.
Walker, M. L., Henry Disston & Sons Co., Portland.
Wallace, V. O., Washington Forest Fire Association, Chehalis, Wash.
Weiks, Carl, Clemons Logging Co., Montesano, Wash.
Weincke, H. F., Washington Forest Fire Association, Port Discovery, Wash.
Welch, Arthur E., University of Washington, Seattle.
Westervelt, John R., Jr., Willamette Iron & Steel Works, Portland.
Weston, J. Roland, Union Lumber Co., New Orleans, La.
Westover, W. S., White Star Lumber Co., Whites, Wash.
Wheeler, C. H., C. H. Wheeler, Portland.
Whipple, C. R., University of Washington Forestry School, Seattle.
Whisnant, Archibald, Lumber World Review, Portland.
Whitaker, Guy C., Vulcan Iron Works, Ltd., Vancouver, B. C.
White, Howard E., Hotel Monticello, Longview, Wash.
Whitney, E. S., General Electric Co., Portland.
Whitney, H. G., U. S. Forest Service, Portland.
Whittlesey, R. D., Lidgerwood Manufacturing Co., Tacoma.
Wiley, J. E., Lidgerwood Manufacturing Co., Seattle.
Wilkinson, J. W., Wilkinson Company, Ltd., Vancouver, B. C.
Williams, A. S., Empire Manufacturing Co., Ltd., Vancouver, B. C.
Williams, Thos. J., Pawling & Harnischfeger Co., Seattle.
Wilson, C. H., Fobes-Wilson Company, Maple Falls, Wash.
Wilson Jack, John A. Roebling's Sons Co., Seattle.
Winkenwerder, Hugo, University of Washington college of forestry, Seattle.
Winte, H. F., Sessions Engineering Co., Portland.
Withrow, Ira L., Oregon Coast Range Lumber Co., Grand Ronde, Ore.
Wolfe, Byron, Crossett-Western Co., Knappa, Ore.
Woodward, Walter A., Walter A. Woodard, Cottage Grove, Ore.
Worthington, R. E., North Western Lumber Co., Hoquiam, Wash.
Wright, J. L., General Electric Co., Portland.
Watson, Frank A., J. A. Roebling's Sons Co., Portland.
Wickes, P. A., Willamette Iron & Steel Works, Portland.
Wood, W. W., Wood & Iverson, Hobart, Wash.
Wood, W. R., Wood & Iverson, Hobart, Wash.
Wood, Chas. A., Kalama, Wash.
Wood, A. G., C. A. Wood, Kalama, Wash.
Wolfe, Chas. E., Oregon Lumber Co., Dee, Ore.
Williams, B. O., Hammond Lumber Co., Kelso, Wash.

Y

Young, E. S., Green Mountain Logging Co., Kerry, Ore.
Young, L. A., Inman-Poulsen Lumber Co., Vernonia, Ore.
Young, Loren W., Inman-Poulsen Lumber Co., Vernonia, Ore.

Z

Zaayer, C. V., Edward Rutledge Timber Co., Clarkia, Idaho.
Zimmerman, W. J., Zimmerman-Wells-Brown Company, Portland.
Zimmerman, Walter, Zimmerman-Wells-Brown Company, Portland

**Oregon Agricultural College Students.**

Angus, C. B.; Bacher, F. A.; Bailey, Shelby; Bagley, J. H., Jr.; Baker, Wm. J.; Balderree, R. Grant, Jr.; Barker, Herbert O.; Begue, Philip; Beith, D. M.; Boswell, Clifford; Brandeberry, J. Kermit; Bursell, H.; Busick, Robt.; Cannavino, A. D.; Case, Paul C.; Clisby, Keith M.; Coburn, Russell; Craven, Alex R.; Cummings, Lawrence J.; Curran, Will E.; Denney, Rex; Dickerson, Don; Dixon, Marion; Doyen Anthony J.; Edmunds, M. R.; England, M. H.; Fehren, R. Bert; Foreman, Roy; Fox, Chas. N.; Furness, Milton J.; Gerlinger, Paul J.; Gibson, Roy C.; Gilbert, P. B.; Gillen, Jack; Graw, Jack; Gnore, Ira C.; Hale, Millard P.; Haun, Jay B.; Hannula, Geo. F.; Hawkins, L. A.; Hawley, Norman R.; Heilbron, E. A.; Hill, C. W.; Hoppong, Geo. R.; Hubbard, M. S.; Hutchinson, Robert D.; Janowski, Albert F.; Johnson, Daniel H.; Jones, Sidney; Joy, Edward L.; Kallander, Harry; Keeney, E.; Lagers, L.; Lawson, H. K.; Lewis, Trevor; Libby, Joe; Lindh, C. Otto; Lloyd, Leslie D.; Lucius, W. W.; Lund, Walter H.; Lyons, Jas. A.; Martin, Ray; Mason, Earl G.; Mercer, Herbert E.; Mielke, James L.; Miller, Douglas Reed; Morse, Clayton C.; Howat, E. L.; Murdock, Kenneth M.; Murdock, Raymond; McGuire, Kelly B.; McKnight, R. C.; Newton, P. A.; Northrup, David W.; Obye, Herschel C.; Olson, Grant; Olson, Ralph H.; Paine, Phillip L.; Parker, Alvin L.; Patterson, H. R.; Pearce, Amos L.; Phillips, William S.; Pieper, Paul S.; Pepoon, Geo. H.; Ramie, Carl; Robinson, T. M.; Rosenkranz, C. R.; Rounsefell, Harry; Rowan, Paul; Scharpf, Lawrence G.; Schreiner, Fred J.; Scritsmeier, Harold, Shaddach, Albert; Shaver, James D.; Shreve, H.; Sloss, W. M.; Starker, T. J.; Small, R. Rowland; Smith, Raymond P.; Smith, Bijah; Spauer, Geo.; Stinger, Chas.; Strehle, Jos.; Sugnet, Fred; Thompson, P. L.; Weaver, Harold A.; Wilkinson, John C.; Wood, Robt. R.; Yost, Percy L.; Zobel, Roy L.

## Congress Notes

No session of the Congress would be complete without the Toots-E electric signal whistle, which C. M Lovsted & Co. always provides.

Old-time loggers may view with alarm and some misgivings the photographs taken at Ryderwood, showing most of the excursionists armed with canes. Canes as a permanent acquisition might properly cause concern, but these were merely novel souvenirs presented by the Long-Bell Lumber Co. Being of Douglas fir, they further illustrate the versatility of that wood.

The courtesies extended by the Portland police department and the Washington highway police patrol in assisting the Congress automobile caravan out of the city and safely to Longview is greatly appreciated. Members of the Washington highway police patrol made special trips to Portland to arrange for a safe journey of the caravan over the route to Longview.

BILL PONTIUS
*Assistant logging superintendent Long-Bell Lumber Co., Ryderwood, Wash.*

S. E. Barwick, for a number of years district sales manager of the Long-Bell Lumber Co.'s Chicago office, has been transferred to Longview, Wash., where he will entertain visitors who wish to inspect the sawmill and woods operations. He got his first taste of entertaining upon the visit of the Pacific Logging Congress. He liked it and so did the Pacific Logging Congress.

No logging congress would be complete without the presence and assistance of Bob Jensen. His courteous manner of handling details of keeping the big show running smoothly are deeply appreciated. Bob's sonorour voice, tempered by kindly and humorous expression, have become an outstanding feature of the sessions. His devotion to the work is exceeded only by his ability to do things well.

The Forest Service had a fire-fighting equipment exhibit on display at the Pacific Logging Congress that aroused a good deal of interest. Included in the exhibit were portable forest fire-fighting pumps of Pacific Ross, Northern Fire and Evinrude make, fire finders of several types, a kerosene pressure torch, pack boards, galvanized knapsack, hand pumps, field telephones and various types of hoes, shovels and rakes.

The Longview, Portland & Northern operated its first passenger train on October 25, when it took its guests to Ryderwood direct from Longview. It should not pass unnoticed that special tariffs had to be filed with the Interstate Commerce Commission to permit the operation of this train. Like good hosts, Long-Bell officials refrained from any reference to such provisions made for the comfort and convenience of its guests.

Sacramento, Cal., was a bidder for the 1925 Logging Congress, the Hotel Senator having sent the following invitation: "Greatest forest background of California invites you to hold next Logging Congress at Sacramento, close to Placerville, Feather River and Klamath Falls lumbering. Luxurious hotel facilities, pleasant climate, recreational facilities, paved highways to famous mountain resorts. A real forty-nine welcome awaits you."

The discussion of railroad construction costs in the pine and fire regions took on a lively aspect. James Girard, of the Fred Herrick Lumber Co., startled his hearers with the assertion that he had a 14-mile tangent on his Crane-Burns line with no cut deeper than four feet. The debate between Meister and Stewart on pine and fir construction costs resulted in a draw. It seems that the pine man has to build a mile of road to get three million feet of timber, while the fir operator must have 30 to 40 million to make a mile of road earn its keep. When the costs are pro-rated per thousand feet the honors are nearly even.

## White Pine Blister Rust in the Pacific Northwest

*By Stephen N. Wyckoff, Associate Pathologist, Office of Blister Rust Control, Dept. of Agriculture*

THE present known occurrence of blister rust in the Pacific Northwest is from Revelstoke and Nelson, B. C., on the east, to approximately 293 miles northwest of Vancouver, B. C., and south to the mouth of the Columbia River. Due to the dryness of the 1924 season, the rust seems to have made very little further advance toward the white pine belt of Idaho or the sugar pine belt of southern Oregon and California.

The Canadian forces operating in eastern British Columbia have found that infections on pines are becoming more and more numerous in the vicinity of Revelstoke. This will greatly enhance the probability of rapid spread of the disease into northern Idaho, whenever weather conditions are favorable for such spread.

The delay in the spread of the rust which has resulted from the dry season of 1924 has been put to advantage in increasing the areas free from the cultivated black currant. All experimental and field work has emphasized the importance of the cultivated black currant as the most active and dangerous agent in the rapid spread of blister rust. Western Montana, northern Idaho, extreme eastern and western Washington, western Oregon and extreme northern California have now been cleared of these plants.

While the eradication of the cultivated black currants will tend to greatly delay the spread of blister rust, this spread cannot ultimately be prevented. Actual control of the disease must finally be based upon local control, the removal of wild currants and gooseberries in the timber stands to be protected. Approximately 6500 acres were cleared of these plants during the past summer on the experimental project conducted by the Office of Blister Rust Control on the Kaniksu National Forest, Idaho. This work, while as yet experimental in nature, is designed to protect the timber in which the work is actually done. (Report to Pacific Logging Congress to be incorporated in proceedings.)

*Students of School of Forestry, Oregon Agricultural College, who attended the Pacific Logging Congress*

**TELEGRAM.**

Berkeley, Cal., October 22.

J. J. Donovan, Pacific Logging Congress: Regret most sincerely that I will not be able to attend this Congress and lend what little assistance I might have been able to give, but, better still, enjoyed the sweet comradeship of Jim O'Hearne and the balance of the Irish Kilkenny cats of high and low pedigree who have been mighty and loyal supporters of the Congress. Best wishes to George Long, my young Holland friend Zaayer from Idaho, Richardson from California and Beardshear of South Dakota, who are honoring the Congress with their presence. Present my compliments to all inquiring friends. Am glad you are on the job. The Irish Free State is safe from the attacks of the nightshirt clan. Hope the Congress will take determined stand for greater fire-protection measures and increased state and forest service appropriations.

GEO. M. CORNWALL,
Editor The Timberman.

*Washington-Westinghouse combined electric yarder and loader*

*Willamette-General Electric combined electric yarder and loader*

# Electric Logging Operations at Ryderwood

**By Frank R. Innes, Sessions Engineering Co.**

THOSE members of the Pacific Logging Congress who availed themselves of the hospitality of the Long-Bell Lumber Co. by making the inspection trip to Ryderwood on Saturday, October 25, the last day of the Congress, may find much in this article that they have already learned, either by their own observation or from the astonishing mass of information that poured out of the megaphone wielded by Bob Jensen. If nothing else, this article will serve to reinforce, and possibly correct in some instances, the memory of what was seen at Ryderwood as well as furnishing information to those who did not make the trip up into the timber.

The Long-Bell logging operations have not yet been working long enough to have accumulated any great amount of accurate data as to cost and performance that is sufficiently well grounded and definite to permit of publication at this time and that phase of the subject must be left for a later story. We will confine this exposition to a description of the electric service to the woods and the manner of power distribution to the machines, including a few words on the design and characteristics of the machines themselves.

Power for the operations at Ryderwood comes from the powerhouse on the millsite at Longview. This powerhouse, fired by the wood refuse from the mills, has a present capacity of 18,000 kilowatts in three 6000 kilowatt turbo-generators. The ultimate powerhouse construction is planned to include six such machines, providing a total of 36,000 kilowatts capacity. For those whose daily thinking is done more in terms of board feet than in terms of kilowatts, it may be stated here that a powerhouse of 36,000 kilowatts capacity is capable of serving an average mixed industrial load supporting a population of nearly 200,000 people without putting any strain on its boilers. Current is generated in the powerhouse at 13,200 volts and is carried by means of a three-conductor 300,000 circular mil. lead covered, underground cable to a sub-station just north of the millsite. This sub-station also serves the city of Longview and includes provision for future construction to serve industrial loads now in development. These services require other cables entering the sub-station and in case of trouble on the woods cable the load may be transferred to one of them. A second cable, identical with the first, is now being pulled into the sub-station to serve the woods load.

*1—Transformer station at Ryderwood, showing the three 1500 kva transformers. 2—Secondary rack at the Ryderwood sub-station. 3—Crane unloading woods transformer or sub-station which is mounted on skids. 4—A close-up view of a portable woods sub-station in service.*

At the sub-station the current is stepped up to the transmission line pressure, 66,000 volts, in a delta connected, outdoor bank of three 2000 kva. single-phase transformers. Connection is made to the transmission line through a three-tank oil switch equipped with overload relays. The line is protected at this point by an oxide film lightning arrester. The transformers, with control and protective equipment, constitute a complete outdoor type sub-station. The cost of this installation was considerably reduced by substituting for the conventional rigid frame overhead bus structure a pair of steel "A" frames at the ends of the transformer bank between which the primary, secondary and transformer connection buses are suspended.

### *How the Line Is Suspended*

The transmission line is of No. 2/0 bare copper cable strung on 50-foot, untreated, western red cedar poles with pin type insulators on the straightaway runs. Corners and curves are made on suspension type insulators. The normal span distance is 200 feet. The total length of the transmission line is 31 miles from the sub-station at Longview to the permanent sub-station location at Ryderwood. It should be noted here that the present Ryderwood sub-station is only temporary and the permanent station will be about two and one-half miles farther into the woods. The sub-station now at Ryderwood is outdoor type, of steel frame and wood pole construction, and contains three delta connected 1500 kva, single-phase transformers, which reduce the line potential to 13,200 volts on the secondary. The secondary bus is arranged with six positions for outgoing lines. The incoming line is connected to the transformers through three single-pole disconnecting switches, which are operated as a unit by a rod from the ground. There is no oil switch at this point, because the transmission line feeds no other service, the Longview oil breaker furnishes adequate system protection, and the 66,000-volt disconnecting switches will break the transformer magnetizing current if it is desired to cut the sub-station off the hot line. An oxide film lightning arrester is connected immediately behind the disconnecting switches. The feeder positions on the secondary bus are mounted on a steel rack and are equipped with disconnecting switches and three tank, 400 ampere, 15,000 volt, oil circuit breakers with trip coils.

### *Woods Lines Do Not Follow Spurs*

The feeder lines radiate through the woods to portable sub-stations, where the line potential is stepped down to the operating pressure of 600 volts. Instead of running the woods lines paralleling the logging railway spurs they are constructed on the lines dividing the yarding areas. It is estimated that this practice saves more than 30 per cent of the line costs over paralleling the spurs. Except at corners and where open spaces make them necessary, no poles are set in the woods, the lines being carried on special cross arms fitted with chain clamps which are fixed to convenient trees. When a portable sub-station is moved to a new location the line feeding it is extended or moved

as the case requires. The chain clamp arms, which are handled with the insulators in place, greatly facilitate such changes in the lines. The insulators are of the suspension type. The use of this type of insulator obviates the necessity of lifting the wires around the ends of the arms and thus considerably reduces time and labor in wire stringing.

Each portable sub-station consists of a 600 kva, 13,200/600 - volt, three-phase transformer mounted on a pair of log skids 30 feet long. There are six 16x16-inch cross members connecting the two skids and the transformer is bolted on the middle pair. Four three-quarter-inch tie rods with turnbuckles are attached at points spaced 90 degrees around the top of the transformer and run at about a 45 degree angle to the skids. The upper framing of the sled is composed of 6x6-inch timbers, on which are mounted the auxiliary apparatus. The line enters the transformer through a three-tank oil breaker. Before entering the breaker the energy passes through a set of choke coils on the line side of which are a set of compression chamber lightning arresters. The secondary from the transformer is connected to a knife switch arranged with a fused double branch, the whole enclosed in a steel cabinet. The branches are brought out in cable terminals projecting from the back of the cabinet. An integrating watt-meter is connected in the secondary. The watt-meter setup is so arranged that a recording instrument may be substituted for the integrating meter if it is desired to obtain graphic records. Since it is anticipated that these portable sub-stations will receive scant consideration in the matter of extra careful handling, the whole setup is made as rugged as possible so that in loading on cars and dumping off at new locations there will be small chance of damage to equipment.

### *How the Cable Is Constructed*

The cable which serves the logging machines is worthy of mention. It consists of three 250,000 circular mil rubber-covered conductors laid with tarred jute fillers, the bunch wrapped with four layers of varnished cambric tape and one layer of half-lapped rubber-filled tape, the whole enclosed in a galvanized steel wire armor wound with a five-inch pitch. The short pitch of the armor and the absence of lead makes the cable very flexible and easy to handle in comparison with standard cable construction. In service the cables are laid on the ground and they must withstand the rough treatment natural in such locations, frequent immersion in water and all the vicissitudes of things underfoot. The cable is made up into lengths of 500 and 250 feet, each end fitted with a waterproof coupling so that connection may be readily made to another cable length, to a transformer sled, or to a logging machine. It is intended that the maximum transmission distance between transformer sled and logging machine shall be 1000 feet and the average run will probably be no more than 500 feet, the length of the longest section of cable. The cable was delivered to Ryderwood by the manufacturer on reels, but the woods practice does not include any provision for reeling. When a cable is to be moved from one location to another it is simply lifted in long loops onto the flats that carry the other equipment and thrown off at the new setting.

### *What the Equipment Includes*

The present logging equipment at Ryderwood consists of ten sides, comprising six car mounted combination yarders and loaders, two car mounted skidders and loaders, and two single yarders mounted on sleds. This equipment was furnished equally by the Willamette Iron & Steel Works, of Portland, Ore., and the Washington Iron Works, Seattle, Wash., each supplying three combination yarders and loaders, one combination skidder and loader, and one single yarder. The essential difference between the two makes of machines is that the Willamette rigs employ gearing to obtain high and low speeds on the main lines and the Washington rigs use a two-speed motor.

The four Willamette yarders, three car mounted in combination with loaders, and one sled mounted single, are equipped with 300 horsepower, 550-volt, 450 r.p.m. motors. The average speeds of the main line are 775 feet per minute in high gear and 375 feet per minute in low gear. The average haul back speeds are 1900 feet per minute in high and 900 feet per minute in low. In order to eliminate mechanical shocks in changing gears while under load the gear change mechanism is so designed that the high-speed engagement slightly anticipates the low-speed release, the high-speed friction band dragging on its drum for a small fraction of a second before the low-speed band lets go. This produces, so to speak, an overlapping of the two speeds and effectually prevents any surge on the line during the gear change.

The Willamette loaders are equipped with 200 horsepower 600 r.p.m. hoisting motors and 35 horsepower 600 r.p.m. boom swinging motors. The hoisting lines move at an average rate of 675 feet per minute and the swinging lines 390.

The Willamette interlocking skidder has a 450-horsepower 600 r.p.m. motor, which operates the main line at an average speed of 750 feet per minute in high gear and 360 feet in low. The haul back line moves at 2100 feet per minute average in high and 960 feet in low.

The three combination yarders and loaders are mounted on cars 46 feet 9 inches long on two four-wheel trucks. The weight of each rig without any cable is 175,000 pounds. The skidder and loader is mounted on a 60-foot car with truck equipment similar to the others and weighs 247,000 pounds without any cable. All cars are fitted with hydraulic jacks to raise the rigs so that cribbing may be set under them before going into operation.

The air for the operation of the frictions and the signals is supplied by Westinghouse Air Brake Co., 52 cubic feet compressors driven by 15 horsepower motors. The maximum air pressure required for all operations is 100 pounds.

All of the Willamette machines are furnished with General Electric electrical equipment. The control contactors for the motors are standard magnetic with gravity kick-out. On the control panel for the yarder motor are mounted main line, brake, and undervoltage contactors, gravity reset inverse time limit overload and current limit relays, and main line and control switches. The control panels for the other motors are similar. All motors are capable of development of a maximum running torque equal to 400 per cent of full load torque.

As stated earlier in the article, the equipment furnished by the Washington Iron Works is the same as that from the Willamette company, namely, three combination yarders and loaders, one single yarder, and one combination skidder and loader. The combination rigs are car mounted and the single yarder is on a sled. The yarder and skidder motors are two-speed machines developing 300 horsepower and 200 horsepower on low and high speeds. The speed change is effected by operating the motor on 24 and 12 poles. The loader hoisting motors are 250 horsepower and the boom swinging motors 50 horsepower.

*Upper—Transmission line of the Long-Bell Lumber Co. is carried on raised poles along the right of way of the L. P. & N. R. R. Lower—The 13,200 volt line in the woods utilizing a tree for support. This view shows the chain clamp and suspension insulators.*

In addition to the essential difference in effecting speed changes on the main lines, a further difference between the two makes of machines lies in the motor controls. The Washington machines are equipped with pneumatic instead of magnetic control contactors. The air cylinders for the contactors are operated on a direct current control circuit with energy furnished from a 35-volt, 1 kilowatt motor generator set. The electrical equipment for the Washington machines was furnished by the Westinghouse Electric & Manufacturing Co.

In respects other than those noted, the general designs and arrangements of parts of the two makes of logging rigs are very similar.

### *Equipment to be Doubled*

The logging machines described in the foregoing comprise about one-half of the equipment for the ultimate woods operations. The transmission line and sub-station installations are designed to supply power readily to 20 such sides. As a matter of fact, it is calculated that with full ratings 24 sides may be served.

The electric logging installation at Ryderwood has attracted the attention of forward-looking producers throughout the whole industry. Logging by electric power has long been an attractive prospect by reason of many very plain advantages and each new installation has attracted much interest. The development of motors and control equipment capable of standing the gaff of such severe service has occupied some of the best brains in the electrical manufacturing industry and they have done, and are doing, a good job.

Heretofore electric logging has depended in large degree on the adaptation of apparatus originally designed for other uses and it was quite to be expected that it should run into difficulties. Also the electrical services to the logging operations have left much to be desired; the machines taking energy from the tag ends of public utility transmission lines that were built with no expectation of the impositions of such loads, and which naturally did not furnish satisfactory service. Or, in the cases of privately built and owned lines taking energy from the operators' own plants, the lines were constructed very often in rather haphazard fashion.

But the Ryderwood installation is different. The electrical equipment of the logging machines was designed for logging; the system of transmission and distribution of energy was the work of competent and capable engineers; the current comes from the lumber company's own plant; in every detail concerning the electrical equipment and service things are as they should be. The motors on the machines receive energy at or slightly above their rated pressure, 550 volts; there are no hang-ups due to low voltage. On a chart taken over eight hours' operation of one machine, the average pressure was 575 volts with a limit of 10 per cent variation. As a matter of fact, cables have been broken because the machine operators attempt to bring in everything at high speed with the abundant and peppy supply of energy at their disposal. The next issue of this magazine will carry a detailed article on electrical operating conditions at Ryderwood.

### *Record of Performance*

Through the kindness of R. F. Morse, general manager of the Longview plant of the Long-Bell Lumber Co., we are enabled to include as an addendum to this article the following table of performance of the electric rigs. It should be borne in mind that these figures were obtained before the logging crews had become at all well accustomed to working the machines. Also machine No. 1 has, since these figures were taken, reached a maximum output of 212,000 feet several times.

**Footage Loaded and Average Per Day From October 1 to 22, Inclusive.**

| | Feet | Gross Hours | Average Per Day |
|---|---|---|---|
| High lead No. 1 | 2,467,963 | 152 | 129,893 |
| High lead No. 2 | 1,152,384 | 112 | 82,313 |
| High lead No. 3 | 660,417 | 60½ | 87,328 |
| High lead No. 4 | 799,290 | 72 | 88,810 |
| High lead No. 5 | 1,929,496 | 147½ | 104,650 |
| High lead No. 6 | 1,133,893 | 144 | 62,994 |
| Skidder No. 51 | 37,619 | 8 | 37,619 |
| Totals | 8,181,962 | 696 | 84,807 |

# Profession of Logging Engineering

(Extract from resolution adopted Fourth Session of the Pacific Logging Congress, Tacoma, Wash., July 25-27, 1912)

The Congress pledges its hearty support and best efforts to the creation of the profession of logging engineering as a distinct branch of mechanical science; and its co-operation in the endeavor of the different universities to create a department of logging engineering. We believe the timbered states and provinces of the West should make liberal appropriations for the adequate equipment and proper maintenance of logging engineering courses in their universities and for the securing of the highest type of educators for furthering the work.

And Whereas, The logging and lumber industry is probably the largest single contributor to the support of our higher educational institutions, and such institutions have for a long time supplied special courses for those engaged in other industries; now, therefore,

Be It Resolved, That the fourth session of the Pacific Logging Congress does hereby petition the state universities of California, Oregon, Washington, Idaho, Montana and British Columbia to provide courses in logging engineering and to grant degrees upon completion of such courses. Your committee suggests that there be appointed a committee of three in each of the various states and provinces asking support of such a chair of logging engineering. This committee is to have full power in each state or province to raise money by donations or otherwise necessary to carry on the campaign, or if advisable to assist directly in the support of such a chair of logging engineering. This committee to co-operate with the faculties of such universities in planning such courses as may be required. Your committee suggests the following to serve upon such committee:

British Columbia—A. D. McRae, Canadian Western Lumber Co., Ltd., Vancouver; Peter Lund, Crows Nest Pass Lumber Co., Wardner; John Hendry, B. C. Mills Timber & Trading Co., Vancouver.

Washington—Geo. S. Long, Weyerhaeuser Timber Co., Tacoma; J. J. Donovan, Bloedel Donovan Lumber Mills, Bellingham; E. P. Blake, Washington Log Brokerage Co., Seattle.

Idaho—T. J. Humbird, Humbird Lumber Co., Sandpoint; A. F. Blackwell, Panhandle Lumber Co., Spirit Lake.

Montana—Kenneth Ross, manager lumber department, A. C. M. Co., Missoula; G. W. Millet, Libby Lumber Co., Libby.

Oregon—J. S. O'Gorman, Wisconsin Logging & Timber Co., Portland; H. C. Clair, Clarke County Timber Co., Portland.

California—W. W. Peed, Hammond Lumber Co., Eureka; Geo. X. Wendling, Weed Lumber Co., San Francisco; C. R. Johnson, Union Lumber Co., San Francisco.

FRANK H. LAMB, Chairman.
A. W. CLARK.
J. A. IZETT.